The Impact of the Gautrain Station in Midrand

Naeema Surti 725027

A research report submitted in partial fulfilment of the requirements for the degree BSc Honours in Urban and Regional Planning, to the Faculty of Engineering and the Built Environment, University of the Witwatersrand, Johannesburg.

I declare that this research report is my own unaided work. It is submitted to the Faculty of Engineering and the Built Environment at the University of the Witwatersrand, Johannesburg, in the fulfilment of the requirements for the degree of Bachelor of Science, Honours in Urban and Regional Planning. It has not been submitted before for any degree or examination to any other University.

Naeema Aiyub Surti

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Abstract

Transport and the need for mobility in a city is dependent on the development of land uses, social factors and economic sectors. It is largely linked to the development of a country. When development takes place, expansion of road networks and in some cases rail networks take place as well, in order to access the new area. Passenger rail is not a new concept, and has been around for over two centuries. In South Africa however, it has been in existence for over 150 years.

Metrorail, PRASA, Transnet and now the Gautrain are the three types of passenger rail available in Gauteng. With the Gautrain gaining popularity by the day, it is only natural to look at the way it has performed over the last six years. From 2010 to now, the Gautrain Rapid Rail has had an impact on the whole province. Its effects can be seen at all stations, especially at Sandton, Rosebank, Centurion and Pretoria. It has spurred all kinds of developments and investments into these areas, allowing them to grow and increase in value.

This report seeks to understand the impact the Gautrain has had in Midrand, looking at its effect on development. It also seeks to demonstrate that Transit Oriented Development has a place in South Africa, and the Gautrain Stations are the best place to implement it. Midrand is still developing and because of this, it has the potential to flourish into a fully functional Transit Oriented Development.

Acknowledgements

First I would like to give thanks to God Almighty, who through prayer has helped me complete this research report in fulfilment of my Honours Degree. Secondly, to my mother and sisters, your constant support and sacrifices have pushed me to produce the best work I could.

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Lastly to my sponsor, to whom I owe utmost gratitude, for without you, I would never have been able to continue my studies and pursue this degree.

Table of Contents

List of Acronyms

BRT- Bus Rapid Transit

CBD- Central Business District

GDP- Gross Domestic Product

GIS- Geographical Information Systems

GSDF- Gauteng Spatial Development Framework

IDP- Integrated Development Plan

MICE- Meetings, Incentives, Conventions and Exhibitions

MTRC- Mass Transit Railway Corporation

NIMBY- Not in my back yard

ORTIA- O. R. Tambo International Airport

PRASA- The Passenger Rail Agency of South Africa

PwC- Pricewaterhouse Coopers

R&P- Rail and Property Development

RSDF- Regional Spatial Development Framework

SDI- Spatial Data Infrastructure

SME- Small and Medium Enterprises

TOD- Transit Oriented Development

UDF- Urban Development Framework

UNISA- University of South Africa

USA- United States of America

List of Figures

CHAPTER ONE:

Setting the Scene-

The Research, Gautrain and Midrand

Rail Transport in South Africa

South Africa's railway has been operating for over 150 years, with connections to many neighbouring and further countries beyond its borders. It began in 1860 with the first train journey transporting passengers, which later moving to commerce, trade and agricultural transportation. Many railway lines were built following the slow success of the first one, including Cecil John Rhodes railway from Kimberly to Vryburg and extending to Botswana as well as the railway line from Pretoria to Maputo, initiated by Paul Kruger (Mathabatha, 2015). After independence, in 1994, Transnet invested heavily in transit infrastructure around the country. PRASA also participated in this and has been providing public transport, as rail transport was the backbone of the transit network. In recent times, much criticism has been directed towards national authorities as the industry has slowly declined as it has been unkempt, which has led to rail transportation use reducing over time (Mathabatha, 2015). Maintaining the railway line is a challenge for the government as their system is old and therefore is no longer a priority. Aspects such as high costs of maintenance, and reduced passengers have left it below standard. This has led many companies and users to turn to road transport as it is more reliable and has the convenience of availability (Mathabatha, 2015).

Since 2004, there is a refurbishment programme in place to stabilize and recover the Metrorail service but it is in desperate need to improve and sustain the service going forward (Mathabatha, 2015). This is a lost opportunity, as railways stations act as a node of development and increase the development and economy of its surroundings (Mathabatha, 2015). This can be seen with the development and implementation of the state of the art Gautrain, a rapid rail service in Gauteng that provides transit for passengers as well as a node for potential development and growth surrounding the various stations (Gautrain Management Agency, N.D.). This modern train offers public transport at an international standard with high levels of safety and reliability. It provides commuter passage from Johannesburg to Pretoria. It also caters to international air passengers with a railway line from O.R.Tambo International Airport, to Sandton City (Gautrain Management Agency, N.D.). It includes 10 stations currently with the potential to expand in the future. Many of the stations are currently thriving as a transit node while others continue to develop and grow, creating value to their surroundings. The Gautrain has gained popularity since it first opened in 2010 and many users, both daily and occasionally have increased. This increase has provided the potential for the Gauteng Provincial Government to conduct a feasibility analysis for future expansions (Gautrain Management Agency, N.D.). Despite the turbulence the economy of South Africa has faced over the past century, rail transport has stood strong;

it is still practical, efficient and an economically feasible method of transit in the country. With rapid rail making its mark, the future of rail in South Africa has a possibility to evolve.

Midrand

Midrand is a suburb located between two of the largest, economically thriving cities in Gauteng. It was established as a municipality in 1981, but due to restructuring of areas after Apartheid it stopped being a town, and was later incorporated into the City of Johannesburg Municipality in 2000. The area is considered to be modern and has experienced growth in the last two decades due to businesses and individuals moving into the area (www.sapropertynews.com). The main reason for this movement is its location between Johannesburg and Tshwane which is considered to be central and accessible to many areas in its surroundings. It has been made more favourable by the development and operation of the Gautrain Station which adds rail transit to the existing transportation linkages that include road and air, in and around the area. The presence of its own local airport, Grand Central Airport, adds value to the area. It is well linked with various networks and is a catalyst for job creation in the area. What once was a large area of agriculture-based land is now the fastest growing commercial and residential hub in Gauteng. Midrand is now being described as a property hotspot as the areas popularity is concentrated on the availability of a variety of residential and commercial developments in all price brackets (www.sapropertynews.com). It supports various price brackets for residential spaces such as bachelor apartments and multi-bedroom houses. It also has exclusive suburbs and lifestyle estates for those looking to purchase more luxurious property. There has been a growth in commercial sector property with a high demand for office spaces. Below is the Midrand area as demarcated by the City of Johannesburg.

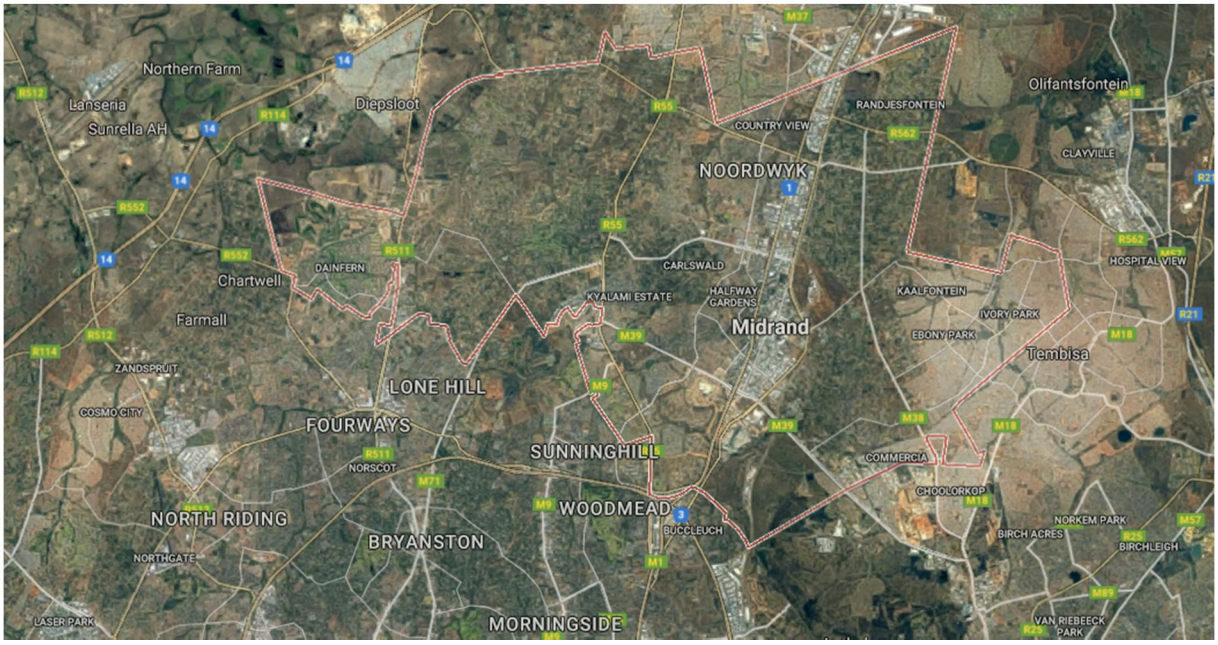

Figure 1.1: Midrand Neighbourhood. Source: Google Maps

Gautrain

Gautrain is a mass rapid transit railway system connecting the main economic hubs of Gauteng, namely, Johannesburg, Tshwane and O.R.Tambo International Airport. It was built to reduce the traffic congestion experienced between these areas. It is aimed at providing another mode of public transport to car users which will attract private car-users to the train (Gautrain Management Agency, N.D.).The Gautrain TOD is characterized by both buses and trains that work together to transport people between the various stations and around their surrounding areas

It also promotes integration between other modes of transport which include Metro Rail, mini-bus taxis, metered taxis, BRT buses and other inner city buses.

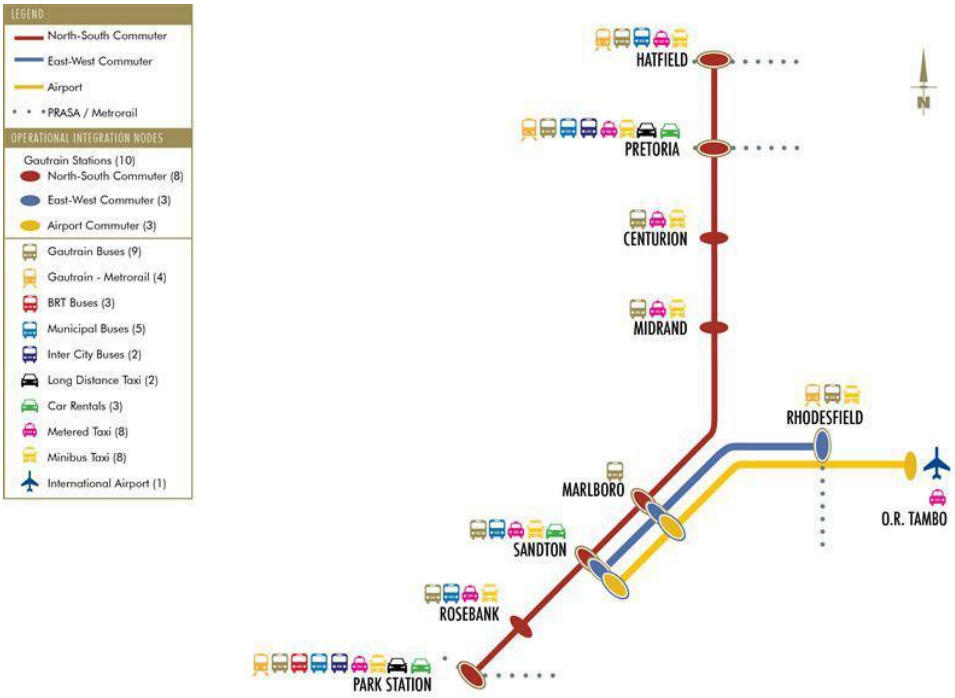

Figure 1.2: Gautrain Stations. Source: Gautrain Management Agency (n.d.)

The train connections includes two main routes, i.e.: the North-South Route which runs from Hatfield Station in Tshwane, down South to Park Station in the heart of Johannesburg; and the West-East Route which connects Sandton and ORTIA via Marlboro in Johannesburg and Rhodesfield in Ekurhuleni. The areas along the route where stations have been located are identified as high density areas of both buildings and pedestrians. They were chosen to relieve traffic congestion between these places as many people commute between them daily.

The Gautrain Project supports the goals of the Gauteng Provincial Government. It has been implemented to support economic growth, development and infrastructure delivery with particular emphasis on (Gautrain Management Agency, N.D.):

- job creation;
- good governance;
- investment in black economic empowerment;
- quality service delivery;
- SME development;
- promotion of tourism.

The other objectives of the Gautrain Rapid Rail Project include (Gautrain Management Agency, N.D.):

- strengthening existing development nodes in Gauteng,
- promoting urban restructuring and redevelopment,
- revitalising Johannesburg and Tshwane CBD's,
- Improve accessibility and mobility between the Johannesburg and Tshwane corridor,
- Reducing car dependency in the Gauteng Region.

One of the aims of the Gautrain stations is to create new nodes for economic opportunities, also creating more densely populated areas and decreasing dependency on cars. It is seen as an impetus to further accelerate development and growth in Midrand and the surrounding areas, as well as all its stations. The stations are evolving into high-density areas with mixed uses that will change the landscape around them.

Property values are escalating and new developments are in the planning phase (Gautrain Management Agency, N.D.). In the future, these stations, acting as cores, will attract high density developments closer to them, thus enabling riders to live, work and shop along anywhere on the route. Unlike some of the other stations such as Hatfield, Sandton, Rosebank and Park that have development and activity immediately at the foot of their doors, the Midrand station is located in isolation from immediate development and pedestrian activity. This therefore restricts the amount of activity the station receives compared to other Gautrain stations. This however has not stopped the Gautrain from bringing people into the area to live and work.

Spatial Foundation of the Gautrain

The foundation and planning of the Gautrain was initiated by the Gauteng Provincial Government. It is based on two strategies, namely, the Gauteng Spatial Development Framework (2011) and the Gauteng Spatial Development Initiatives. Both of these strategies pursue provincial development. They are both intended to direct the province towards achieving sustainable development (Gautrain Management Agency, N.D.).

The GSDF focuses on implementing spatial principles and improving urban form and the SDIs focus on achieving development through economic growth and direct investment (Gautrain Management Agency, N.D.).

The GSDF bases its focus on five factors to achieve sustainable development and it is obvious that the Gautrain meet these criteria (Gauteng Growth and Development Agency, 2011):

1. Resource based economic development- the Gautrain aims to achieve economic development as a spin-off, which will achieve direct investment and will connect the core areas of the province.
2. Contained urban growth- the Gautrain, as it will be developed as a TOD, will aim to compact the city and improve the utilization of resources already provided it will increase densities to enhance feasibility.
3. Redirecting urban growth- the Gautrain will contain current and future urban areas and will impact the future composition of surrounding areas.
4. Rural development beyond the edge- rural development is to be protected by the urban edge. The Gautrain will be located in the city, attracting development and densities closer to the stations and creating a stronger urban area, which will reduce urban sprawl and promote rural retention.
5. Mobility and accessibility- due to the presently dispersed settlement pattern, people in gating rely heavily on mobility and accessibility. Mobility must be enhanced to improve movement of people and due to heavy road congestion, the rapid rail poses as a solution and an alternative to public transport.

The above points are the principles that underpin the GSDF and the Gautrain complements the existing and new urban form. It actually enhances the ability to create a totally unique, new urban form (Gautrain Management Agency, N.D.). This is possible as the Gautrain is located in the core economic areas of the Province, and it brings many opportunities for

development along with it. It allows density and land use changes which developers can explore and create with.

Currently private transport is the preferred method of transport as it allows a traveller freedom of movement. This freedom of movement has created urban sprawl, because it is easy to access any part of the city. This has allowed development to take place in many small new nodes on the urban edge and outskirts of already existing nodes. The Gautrain aims to redefine this free method of development and create nodal development in an oblong pattern, confined by the linear railway line. The image below indicates the Gautrain development vision for nodal development.

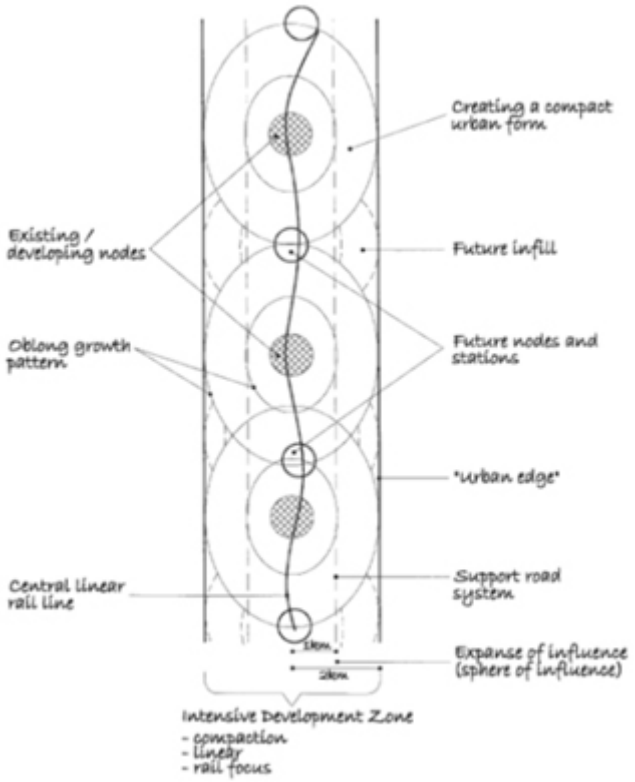

Figure 1.3: Gautrain Nodal Development. Source: Gautrain Management Agency (n.d.)

Along with the linear development of nodes, each station has principles that relate to development and will guide spatial form. High densities of people are essential for the areas surrounding each station as these will be the people who will use the train. The more densely populated the area, the higher rider potential each station will have. As for access to the station, there is a certain level of ease that is required for riders to access the station and use it as a means of transport. This entails easy access from residential areas by personal vehicle or bus feeder routes that pass through the station regularly. Land use controls ridership hence a variety of land uses should surround stations. Residential development is

the most favourable type of land use as it would generate many riders. High density commercial land use also influences many riders as people would use the train to get to and from work. Office spaces have higher peak period trips. These would require bus feeder systems to get people from the station to areas close to where they work. Manufacturing and warehousing have limited riders due to the small amount of people working in these establishments. It is clear that land use affects how well the train may perform thus, when station development is taking place, maximum ridership, increased land use mix and increased residential land uses should be taken into consideration.

The analysis and proposed goals of the Gautrain were established before it began and this is the reason for the manner in which the above has been discussed. From 2010 to 2017 the Gautrain has been able to achieve many of these goals mentioned and continues to promote and improve itself as a rapid rail transit system in Gauteng.

Expansion of the Gautrain Rapid Rail

After six years in operation the Gauteng Provincial Government have been able to tick off some of their aims they had for the Gautrain to achieve such as being a modern and effective public transport system for the people and the economy. It has created accessibility, mobility and jobs for people in the province. Due to the growing ridership and passenger demand, there has been a request to expand the Gautrain. The provincial Government has faith that should rail-based transport wish to grow, there is a need to extend the Gautrain and modernize the Metrorail system. This will in turn prevent urban sprawl and reduce road congestion. The extension of the Gautrain will provide economic and transport related benefits to the Province and people. A feasibility study was done to determine future routes of the Gautrain and the following links and stations were identified:

- On the existing North-South route, a station after Park in the South at Westgate;
- From Sandton moving west, a station to Honeydew, stopping at Randburg;
- From Honeydew, South towards Naledi in Soweto, stopping at Ruimisig and Roodepoort and moving North-East to Mamelodi stopping at Cosmo, Fourways, Sunninghill, Blue Hills, Samrand, Irene and Tshwane East;
- Lastly on the West-East line from Rhodesfield, a station in Boksburg, stopping at East Rand Mall.

The expansion will be divided into seven priority phases due to its enormity and intricacy. The total network is shown below.

Figure 1.4: Gautrain Expansion Routes. Source: Gautrain Management Agency (n.d.)

Aim of Research

The Midrand station was chosen as the location for a Gautrain Station as the area is expected to become the hub of activity in the North of Johannesburg (Companies, 2011). It has become an area of interest in development and densification. Just like all the other Gautrain stations, it has aimed to develop as a Transit-Oriented Development node in order to improve economic and development opportunities. The reason this station was chosen is to gather information about the developmental impact the Gautrain Station has had and the impacts it may continue to have in Midrand. This topic was also chosen to add to the literature available on TODs in South Africa as well as the literature on Gautrain Stations impacts on their areas. There has been research done on other Gautrain stations and this research aims to add to that literature. It aims to look at international examples through reviewing literature and case studies on them and relating it back to Gauteng and looking at how they may be similar or vary. The context in which the Gautrain station will be looked at

in Midrand is through a developmental perspective and therefore will focus on property development in the area shown below.

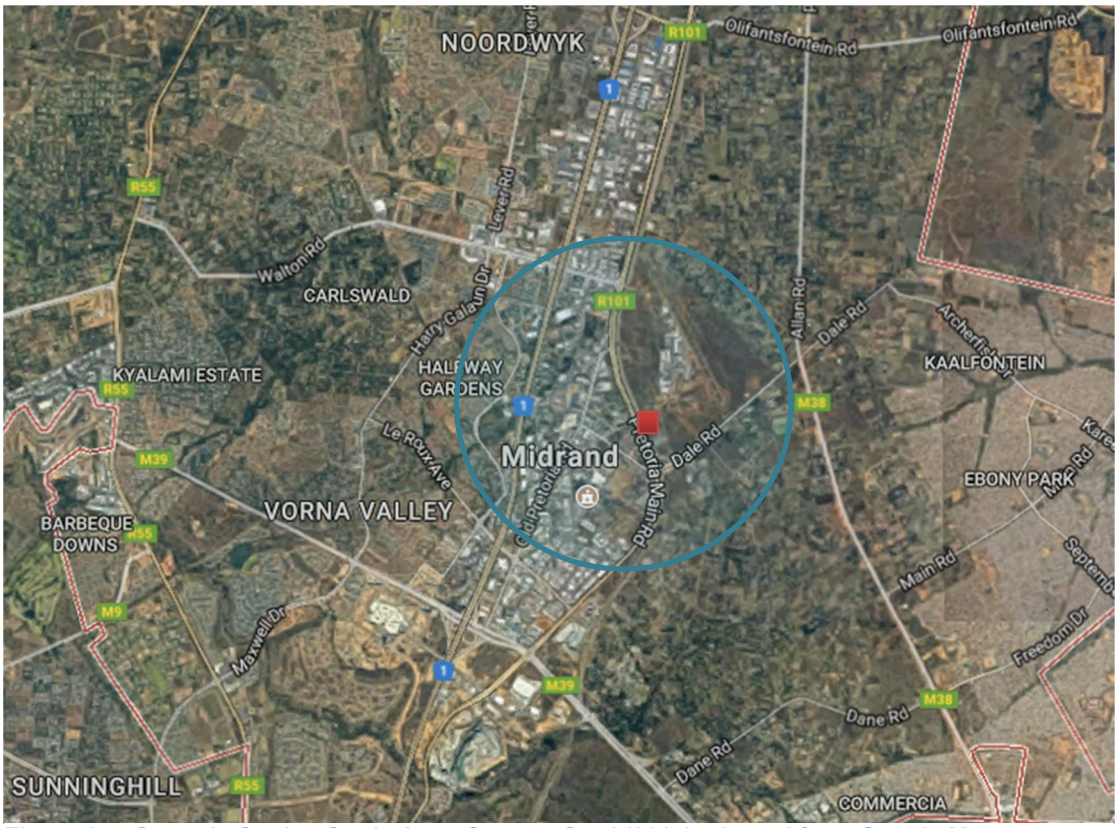

Figure 1.5: Gautrain Station Study Area. Source: Surti (2017) adapted from Google Maps

Gautrain Station
Study Area

Problem Statement

Since the development of the Gautrain station in Midrand, it has become an area of interest in development and densification; introducing associated benefits and challenges to the area. The rapid rail has been developed to increase densification and activity around the stations and extend this to areas moving away from it. It has been categorised as a Transit Oriented Development (TOD). Its routes are specifically designed to accommodate people working and living in the area, to be able to easily use public transport in their day to day lives. However the bus routes do not extend over a wide area and is limited to the routes that they travel on, limiting the number of people being able to use it. However the trains have been more effective in getting people to and from work that live at a distance. For example, many people living in the East Rand (Benoni and Boksburg), park their cars at the Rhodesfield station and use the Gautrain to get to Park, Sandton, Midrand, Centurion and

Hatfield, and this happens at the other stations as well. This is an example of a decrease in car dependency which was one the aims of the Gautrain project. Research has been done before on the impacts of the Gautrain station at Rhodesfield and Park stations, and the following research is being done to add to the literature on the impacts of the Gautrain at a different station, Midrand. It is looking at how the location of the station has affected businesses, and development of properties, both residential and commercial. One of the main aims of a Transit Oriented Development is to foster a more functional relationship between transit and property development and this research is being conducted to see if this has been achieved in Midrand.

Research Question

From the above mentioned problem, my research is set out to answer the following question:

What is the impact of the Gautrain Station on the development in Midrand?

It will look at the past land use and patterns of development before the Gautrain was built, whilst it was being built, and since it has been in operation through Mapping. It will also look at the increase or decrease in development since the station was announced and what it may mean for the area. In order to fully understand the analysis and unpacking of this question, it will be answered using the following sub-questions.

Sub-Questions

What kind of property development is taking place?

What has been the stations impact on property prices?

Has densification taken place in terms of people and property?

What changes is the Gautrain Precinct experiencing?

Research Methods

With regards to the research that needs to be undertaken in order to respond to my research question, I will look at qualitative methods of research. Qualitative research according to Creswell (2003: 18) is “one in which the inquirer often makes knowledge claims based primarily on constructivist perspectives(i.e. the multiple meanings of individual experiences, meanings socially and historically constructed, with an intent of developing a theory or

pattern) or advocacy/participatory perspectives (i.e. political, issue –oriented, collaborative or change oriented) or both". The research endeavour is classified as a correlational study. This is a study undertaken in order "to discover or establish the existence of a relationship/association/interdependence between two or more aspects in a situation" (Kumar, 1996: 30). I will be looking at the impact the Gautrain Station has had on the property development and densification of people and buildings in Midrand.

The method adopted in my research is a combination of a *case study, interviews and mapping.* A case study according to Grinnell (1981: 365) "is characterised by a very flexible and open-ended technique of data collection and analysis". According to Kumar (1996) using a case study is useful when exploring an area where little is known or where you want to have an understanding of a situation); *Interviews* is where attitudes, opinions or perceptions, towards a certain issue are explored through free and open discussion (Kumar, 1996); and *online mapping* which uses captured images of the area in a particular year to see the change overtime of the study area.

My approaches to information gathering include both primary and secondary data. Primary data includes gathering information from primary sources through the means of questionnaires, interviews and observation, whereas secondary data comes from secondary sources such as documents. These may be government or semi-government publications, earlier research, personal records and mass media.

Ethical Considerations

Ethical considerations with regard to my research that need to be taken into account are the ways in which I present myself and approach my interviewee, as well as checking if what I am asking of them is ethical and not in any way violating their privacy and confidentiality. I need to state to them exactly what my research is, the purpose (as a requirement for my honours degree), what is needed in the research, and how I intend to interpret the data I receive, which will include omission of personal data if they wish so. It will also include protecting any data sources I find that may be confidential or unpublished yet.

Chapter Organization

Chapter 1 of the research is the introductory chapter which looks at transport in South Africa, the study area, the Gautrain, the Aim of the Research, the main questions to be answered and the way in which the research will be conducted.

Chapter 2 looks at international and local literature. It focuses on Transit Oriented Development, Densification and Property Development. It also looks at case studies on TOD to see the successes and failures it has had in different countries around the world.

Chapter 3 describes the methods of research that will be adopted in the research process. It looks at how information would be gathered and the kind of information required in answering the research question and sub questions. It also looks at the context of the study area

Chapter 4 looks at data gathering and interpretation as well as analysing the collected data. It includes observations, interviews, grey literature and GIS mapping.

Chapter 5 is an analysis overview. It looks at the data collected and presented in chapter 4 and answers the questions from chapter 1 reaching a conclusion.

CHAPTER TWO:

Analysis of Existing Literature- Transit Oriented Development and Property

Overview

The following literature review will look at Transit Oriented Development. It aims to unpack the notion internationally and at a local scale. It starts off with looking at what it TOD and how it has been explained by different authors. Secondly, it shifts focus to urbanisation in developing countries, the impact on property surrounding TODs and land uses surrounding a transit node. The next section looks at a case study of Hong Kong, and how TOD has been implemented to be a success. It then looks at the local scale and brings TOD to South Africa, looking at how it has been implemented in Johannesburg. Lastly the chapter looks at the barriers to TOD and concludes with a conceptual framework. This review is important to understand the literature that exists on these concepts and how I may use it to relate to my research topic and answer my research question.

Transit Oriented Development

Origins of TOD

Transit oriented development is a land use tool that guides development in a sustainable manner. It is mixed use development around a transit facility. It comes in many forms and sizes, from high density development of an urban area to lower density single-family developments. It is adjustable and malleable and therefore, it has many definitions for the various types of TODs out there. A simple definition is “a compact, mixed-use development near transit facilities and a high quality walking environment” (Cervero, et.al, 2004 p.S1).

In 1993, Calthorpe introduced the concept of TODs and offered a set of guidelines for the concept. He defined it as “a mixed use community within an average 600m walking distance of a transit stop and core commercial area. TODs mix residential, retail, office, open space, and public uses in a walkable environment, making it convenient for residents to travel by transit, bicycle, foot, or car (Calthorpe, 1993). The reason for him developing a new concept to use as a tool for planning was due to the heavy dependence on automobiles in single-use suburbs which discourage walking. His idea was to promote the pedestrians need for public spaces that make life possible such as parks, walkways, squares and plazas (Calthorpe, 1993). Eliminating automobiles was impossible as people needed to travel distances to get to work and service areas as much as they needed to walk around in public open spaces. He proposed public transit as the solution to meet the needs of mobility while keeping aspects such as walkability and pedestrian friendly areas.

Calthorpe (1993) developed a number of principles for TOD that accompanied and would successfully realise the concept. These included Calthorpe (1993):

- Organize growth regionally- transit supportive growth;
- Mix of land uses- commercial, housing, jobs, parks and civic uses all within walking distances of transit stops;
- Pedestrian friendly street network;
- Preserve natural areas;
- Provide a mix of housing types, densities and costs;
- Make public spaces the focus of building orientation; and
- Encourage neighbourhood infill and redevelopment along transit corridors.

TOD explained by other Authors

Wilkinson (2006) reports that the concept of Transit Oriented Developments appears to have originated in the United States during the late 1970s, but gained prominence during the 1990s through the association of 'smart growth' and 'New urbanist' movements. He identifies that general features of a TOD include (Wilkinson, 2006, p224):

- The neighbourhood is centred on a bus or rail transit station that extends to an easy walking distance radius of 500m-800m,
- The urban fabric is developed at moderate to higher densities but remains 'human scaled' and includes provision for public and civic spaces,
- Its road network is laid out in the form of an 'open' grid and features provision for pedestrian and cycle movement as well as calm motorised traffic.

He also states that there are beneficial impacts of TOD and these include but are not limited to (Wilkinson, 2006, p224):

- The enhanced accessibility of TOD areas may increase land values,
- Reduced use of motor vehicles, hence reducing overall congestion and travel times as well as benefits the environment,
- Residents are more likely to use public transport which would increase ridership and improve operating costs, and lastly
- Proximity to transport services improves mobility, and the provision of walking and cycling enhances the general liveability of an area.

Figure 2.1 and 2.2 depict how the TOD concept would be developed at a neighbourhood scale and at a city-wide scale.

At a neighbourhood scale a TOD neighbourhood should consist of at least one main arterial route. It should include retail, commercial and offices close to the main routes arterials and the transit stop. The transit stop should include an open / public space where pedestrians may sit or walk through on their way to work or home. It should include some residential spaces of different densities and value, in order to cater to many income levels. It could include a secondary area which may be residential, business or even a social amenity such as a shopping complex. In the time it takes a person 10-15 minutes to walk from one place to another, they should pass all three types of land uses.

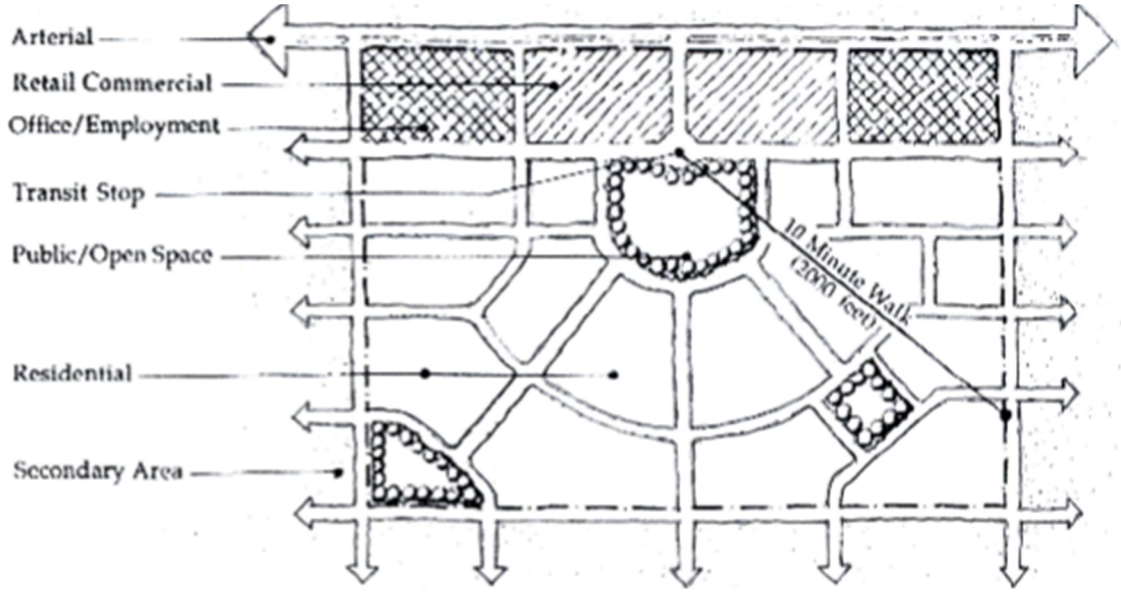

Figure 2.1: Neighbourhood TOD. Source: Wilkinson (2006)

At a city-wide scale, TOD is a cluster of a neighbourhood transit development. It includes a major freeway as well as many arterial routes. It includes busses, rail and motor vehicle transport. The transit stations offer park and ride facilities for those who live further away from the bus feeder routes and would still like to use the train and other buses. It has a main commercial area, urban area and smaller residential areas. It has many open spaces and parks. These different areas make up a city TOD.

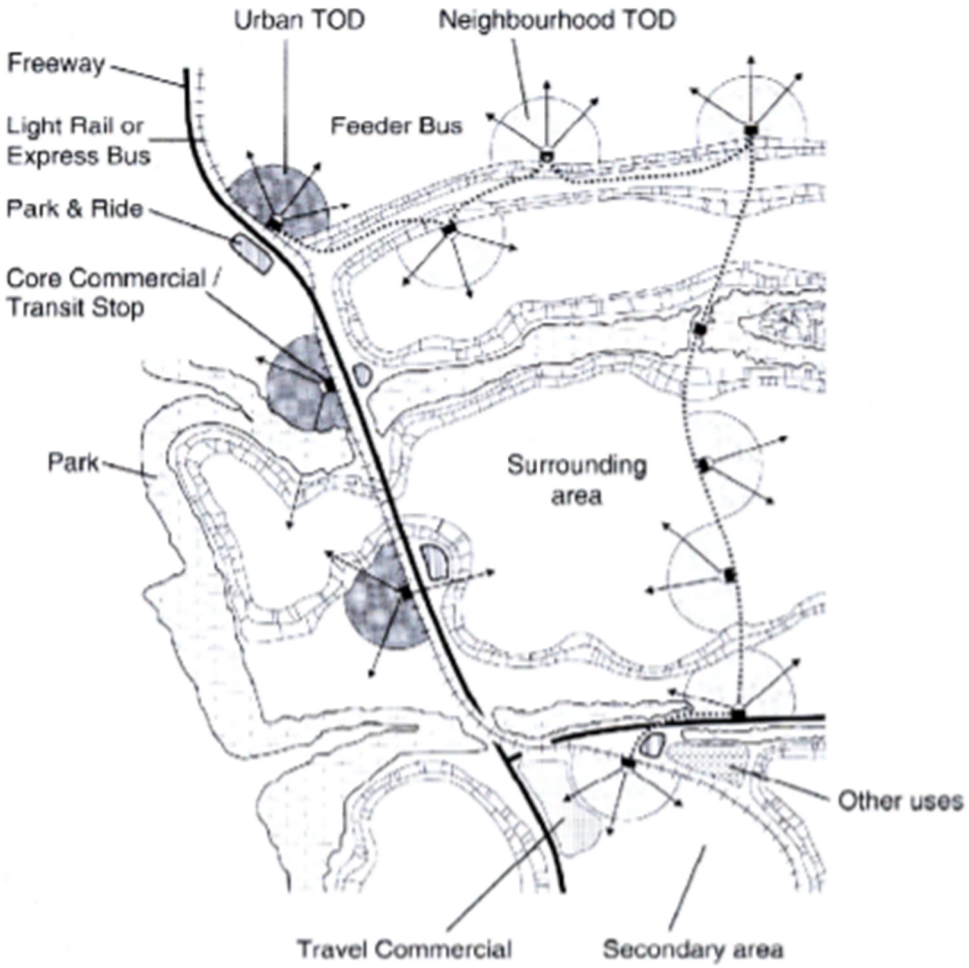

Figure 2.2: City-wide TOD. Source: Wilkinson (2006)

Brendel and Molnar (2010, p.1) identify a TOD as a “commercial and residential district built around mass transit stations or corridors designed to encourage ridership on buses, trains, trolleybuses, trams and ferry’s.” Typical TODs have high-density mixed-use buildings around transit stations with low density spreading outwards for about one half to one kilometre. They are also designed to encourage walking and cycling, control the flow of automobile traffic and reduce the amount of land devoted to parking. Brendel and Molnar (2010) look at the Jersey Village TOD located in the City of Jersey Village, Texas, as an example to explain how a TOD plan will change the image of the area. The TOD would be surrounded by a grid of neighbourhood streets and radiating outward from the rail station are differently zoned districts which are the ‘core’, consisting of three to five story commercial and office buildings. Next would be the ‘transition’, with two to three stories commercial and residential and lastly the ‘neighbourhood’, with one to two story residential and office buildings (Brendel and Molnar, 2010).

Fast transports systems help promote the movement of large numbers of people between places where they live, work and play (Urban Landmark, n.d). History has shown that transportation infrastructure has also helped promote the growth and development of some of the largest cities such as Frankfurt and Hong Kong (Urban Landmark, n.d). South African cities lack modern mass transit systems for transporting commuters and as a result, riders/passengers spend a lot of their income on transport (Urban Landmark, n.d). The Gautrain Rapid Rail link, the BRT and Metrorail represent investments in the transportation network. They allow opportunity for the cities to grow and promote development which will in turn increase land values. Businesses, tourists and residents want access to efficient rapid transit (Urban Landmark, n.d), therefore transit stations can be an asset for attracting and concentrating development. This has resulted in the cities promoting the concept of TODs. They allow compact, walkable areas with mixed use development, which allows opportunities for those living in the area and reducing travel costs to distant jobs. The government of South Africa have identified transport objectives such as improve access to affordable transport, reduce road accidents, promote infrastructure investment, and these objectives may be achieved through investment and use of Transit Oriented Developments (Urban Landmark, n.d).

Transport infrastructure creates value on land. The demand for land is partially driven by how well connected it may be to the user, and that users will be willing to pay for this added accessibility (Clark-Jones et al., 2016). Transport infrastructure is most often funded by the public yet local land owners, project developers and property investors profit most from transport investment. Creating successful neighbourhoods in relation to transport interchanges can be achieved through TODs (Clark-Jones et al., 2016). This is not about a single project but rather reducing urban sprawl and improving the relationship between jobs and housing (Clark-Jones et al., 2016). It is about creating sustainable, integrated, mixed use neighbourhoods around high quality transport systems. Transport connects people and planners can use that as a tool for urban development.

Transit Oriented Developments as reported by Clacherty (2010) is a straightforward concept. It includes developments of medium to high density housing, easy access to public amenities, jobs, retail and services, all located along or surrounding a public transit system. In South Africa, transport interchanges such as the Gautrain, the BRT and mini-bus taxi system provides the opportunity for investments to create a successful TOD approach (Clacherty, 2010).

The above variants of TOD show how interchangeable it can be to a specific area or region. It can be many things, while still being mixed use developments surrounding a transit node. Its attributes are relative to the surroundings. Many authors define it in different ways focusing on a specific aspect such as the transit node, the residential developments, the commercial developments, the public and walkable spaces; and many others. In the end it is about developing around a public transport mode sustainably.

Rapid Urbanisation in Developing Countries

With densification and mobility comes the challenge of rapid growth, and these are different in developing countries as compared to those in wealthier developed ones (Cervero, 2013). There is also a challenge of coordinating transportation and land use. The urban planning challenges in developing countries are daunting. Rapid population growth and urban migration has widened income disparities and demands for basic healthcare and services have increased rapidly. Cities face challenges such as feeding, clothing, housing, educating and transporting costs that they cannot keep up with. South Africa is one of those countries who shares the challenges mentioned. Integrated transport and land use planning needs to be elevated in importance in developing countries to keep up with the demand of the ever growing populations (Cervero, 2013).

Africa has been the most rapidly urbanising region during the last four decades. Urban growth in developing countries has been higher than that of developed countries because they have experienced a higher rate of overall population growth (Bhattacharya, 2002). One distinctive feature of urbanisation in developing countries has been the development of large cities such as Johannesburg and Lagos. In developing countries it has also been noted that the urban populations are too concentrated in very few cities leading to urban sprawl. This is known as Urban Primacy (Bhattacharya, 2002). An increasing urban population may be related to rural-urban migration and immigration into the cities from other countries. It is natural that people move from rural areas to cities in search of better opportunities. This is the case with many cities in South Africa. In Sub-Saharan Africa, migration accounts for much of the population growth compared to any other areas with developing countries such as Latin America. Trends of rural-urban migration have declined in general over the world, but specific trends in ‘female only’ rural-urban migration have increased. This can be seen in countries such as India, Nigeria, China and Mexico (Bhattacharya, 2002). Lastly, it needs to be noted that an increase in migration to cities has a positive impact on economic

development. Increases may improve economic development and opportunities for new migrants and residents of cities (Bhattacharya, 2002)

The Impact on Property surrounding TODs

With an increase in rail transit investment in cities around the world, there has been an increase in the amount of research conducted on the property value impacts of rail systems. Good pedestrian links enhance the value of properties within rail proximity. This is simply because of convenience and accessibility by foot to a station (Duncan, 2010). It allows the pedestrian to reach their mode of transport easily whilst making the journey pleasant and interesting. Being close to a railway adds value to property, give that it is located in a pedestrian friendly environment. If the area does not cater at all to pedestrians, it is less likely that the value of those properties would rise drastically as there would still be a heavy reliance on automobiles to access the area (Duncan, 2010).

The type of property also impacts the way a station may affect it. If the property is residential with open public spaces such as parks and small shopping areas, the presence of a transit station will increase the value. This is due to the fact that it will become a well sought out area due to the convenience of amenities and residential spaces being in close proximity to the train or bus station (Duncan, 2010). If the area where the station is located is used for storage warehouses, factories and manufacturing plants, the impact of the station on the property will be minimal, as there is no need to many people to visit the area on a daily basis (excluding the few people that may work there). The station and its current land uses also have an effect on the types of future developments that may take place in the surrounding area (Duncan, 2010).

According to a report by the Hong Kong Polytechnic University (2004, p.ii), the integrated rail-property development model used in Hong Kong represents the unique relationship between railway and land development. It looks at what influences developments in an area where a railway station is located;

> "it has four principal elements: *policy*-government policy support in terms of land grant and commitment to a mass transit railway as an essential mode of transport; *process*- excellent planning, management and control of the development process; *project*- development of high quality and density residential and commercial properties, appropriate land diversity and integration with the railway; *organization*- a

well experienced company that is committed to providing world class railway services and property development".

There are many benefits of an integrated rail-property development model. According to a study by The Hong Kong Polytechnic University (2004, p13) these benefits include:

- Improved land value around the stations;
- Intensification of development density of the land around the stations will improve ridership and operational viability;
- The government can receive financial gains in terms of land premiums and higher rates ; and
- Society achieves a more sustainable form with regard to compactness of urban development, efficient use of space, more open space and fewer sprawls, reduced pollution, and a pedestrian friendly environment.

Another model known as the 'node-place' model that has been used in Tokyo is another example of a successful model that links property development to a transport node. The basic idea with this model is that improving the transport provision or node value of a location will create conditions favourable for further development in the area (Bertolini and Chorus, 2011). This development of the area will in turn create favourable conditions to further develop the transport system in the same area (Bertolini and Chorus, 2011).

Land Uses Surrounding a Transit Node

Transit nodes are most effective when complemented with a variety of land uses. In order to provide benefits for the passengers and users, businesses and residents, transit nodes should target offices, service providers and residential uses so that more people come into contact with the transit node and it is not built in isolation. These preferred uses create foot traffic and high levels of activity (Pace, n.d.). Transit nodes tend to support shopping, service, restaurants, cafes and other retail that generates pedestrian traffic and in turn, more investment into the area. The investments into an area with a transit node require a variety of activities. For example, an office or other commercial businesses with regular office hours creates activity during the week, whilst residential and entertainment uses create activity during the night and on weekends (Pace, n.d.). Mixed use developments are usually accompanied with transit nodes as they create a variety of uses in one space. These structures need to be designed to be flexible over time to respond to ever changing markets. Lastly the development density needs to be accounted for. Increasing the level of density

around a transit service makes it more effective since there is more potential for a variety of people to use the transit system. Municipalities should consider ways in which density may be increased around transit services so that development meets goals of both increased access to transit mode and preserving the communities character (Pace, n.d.).

Brinckerhoff, in his report in NEORail (2001) summary document on the effect of rail transit on property values, found out that railways transport systems have an influence on residential property more than that on commercial property in America. This study was conducted on 2000 and therefore at the time of his research, there was more data on the impact of residential land uses than commercial land use, which resulted in his conclusion. In the case of Midrand, part of the research that will be conducted will be to determine, over time, has the Gautrain affected commercial property and developments more than or less than residential property and developments. Brinckerhoff (2001) also states that, at the time, proximity of residential property to rail lines would have a negative impact on residential values as there would be too much noise and vibration. This part of his research looks at rail as a commercial use and not as a rapid commuter use. He then goes on to state that due to the high speeds and efficiencies of rapid commuter rail, there is an increases the sphere of influence that station has on the value of property in the area. This means that the parcels of land surrounding the station can "turn gains in accessibility into higher land values" (Cervero, 1984, p134).

From the literature above, it is clear that there are many benefits of implementing a Transit Oriented Development and this has positive impacts on the surrounding area in terms of property values, economic opportunities and job creation. If executed well, the station can work as a magnet to increase growth and development in the area.

Commuter Rail Accessibility and House Values

While public transport plays a vital role in the social and environmental dynamics of an area, it also has an impact on the economics of its surroundings (Dubé, Thériault and Des Rosiers, 2013). Public transport improves people's accessibility to work places as well as places with goods and services. There is no question about this. It does however impact the surrounding vicinity quite heavily. The first impact is the environmental impact when building the transit node. The second is the funding of the node, as costs are quite heavy when it comes to developing a sustainable transit node that serves many areas. Lastly is the economic impact of the area and the properties surrounding the node (Dubé, Thériault and Des Rosiers, 2013). This comes in the form of a strong connection between said public

transport and real estate. Real estate prices are influenced by its property attributes as well as nearby amenities. Dubé, Thériault and Des Rosiers (2013) concluded that commuter rail transit positively affects real estate values. The gains in accessibility to stations are from a combination of immediate proximity and BRT facilities. The house price appreciation was experienced in close proximity to the station when a case study was done in Montreal, Canada (Dubé, Thériault and Des Rosiers, 2013). In order to maximize sustainability and social welfare, they suggested a joint development strategy with railway development and real estate development.

Bowes and Ihlanfeldt (2001) suggest that due the fact that a residential property is closer to a transit node and is reducing the cost of commuting by car, real estate or property nearby should be raised in value. It would be better to attract retail activities as well. It also raises the value and attraction of nearby neighbourhoods as they are also close by to a major transit node. Transit stations that are located further away from a major CBD tend to attract large residential developments (Bowes and Ihlanfeldt, 2001). A study conducted in Turkey showed that investments in commuter rail have changed the prices of land rent surrounding the railway station. It showed that railways and transit nodes provide additional economic value to an area beyond the value of the railway itself (Bowes and Ihlanfeldt, 2001). Another study conducted in Netherlands showed that distance from the station is a major contributing factor when it comes to rental prices. It showed that housed that are in a 15km radius are 25% higher in rental and sales prices than houses that are outside the 15km radius. (Bowes and Ihlanfeldt, 2001)

Case Study- Hong Kong

Hong Kong is known for its integration of rail transport and urban development around the world. The city has high densities and many benefits have come from this such as a successful world class rail transit network. Due to the access of a fast and reliable transit network such as their rail services, land prices closer to the railway stations is relatively higher than elsewhere in the city (Cervero, 2009). Hong Kong has an approximate population of nearly seven million within its total land area. This means most of the people live in the cities coastal area that is built up tremendously. It is noticed by residents and visitors to the city that public transport is the lifeblood of the city as it offers many different modes such as railways, street-trams, busses and mini busses and ferries (Cervero, 2009). With approximately 68% of residents using either trains or busses to get to employment, the efficiency and reliability has to be of a high standard (Cervero, 2009).

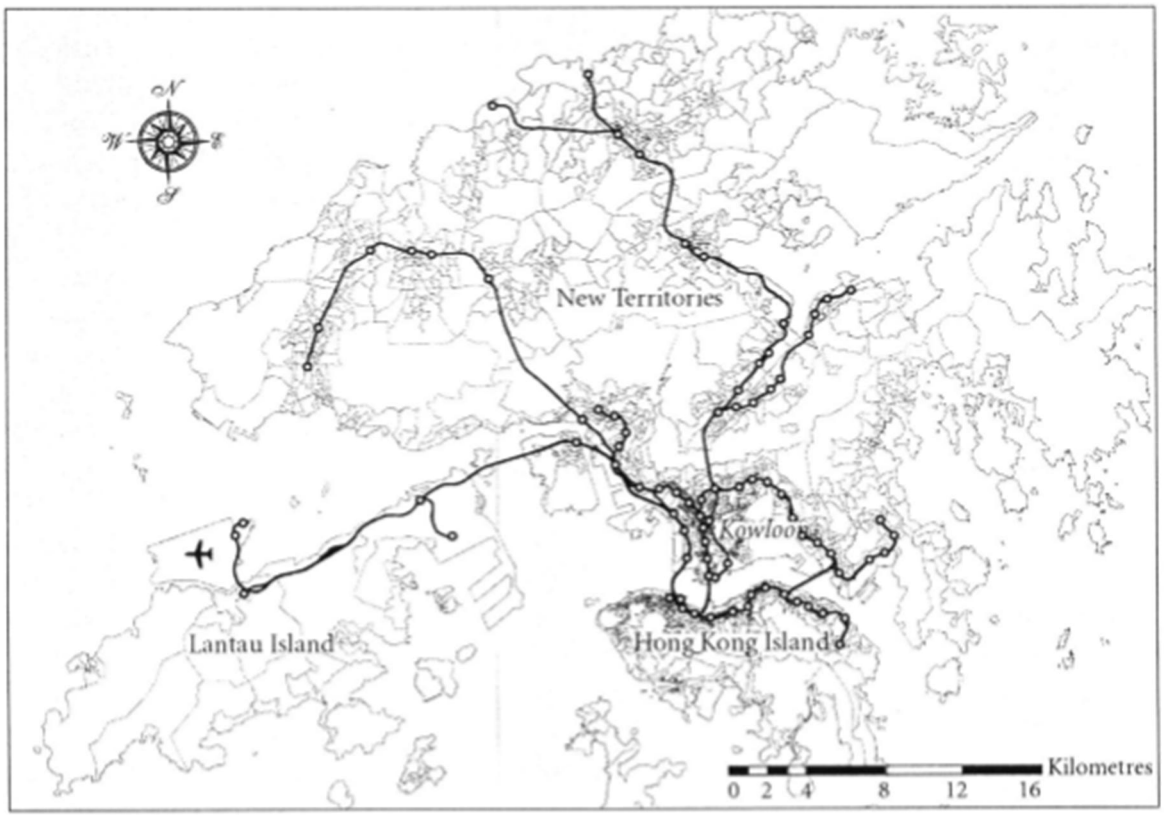

Figure 2.3: MRT Railway Network. Source: Cervero (2009)

The railways network provides 168 km of high capacity services that run through many parts of the city. It has 85 stations with a station approximately every 2km. This makes up the finest grained railways network in the world (Cervero, 2009). A combination of high densities and high quality public transport has produced they highest level of transit usage in the world as well as driven down the cost of motorized travel in the country. With such a vast amount of transit options, residents enjoy travel cost savings in comparison to other countries in the world.

The MTRC which is the railway corporation, have implemented a rail and property (R & P) system where planning is based on both rail and property development simultaneously (Cervero, 2009). It is a tool that promotes Transit Oriented Development. Mixing various land uses and developments with transit stations has boosted integration between many areas with railway stations and shopping and residential being the most popular. Residents are able to experience environments where they can go from their luxury apartments to sopping below and then directly into a station to another area without stepping outdoors. R&P is not a new concept as it has been implemented in USA. Hon Kong is just one of the few places in the world that has been able to implement it seamlessly while generating profits (Cervero, 2009).

How R&P works in Hong Kong

The access to land rights is what allows the R&P programme to function. The government of Hong Kong does not provide cash subsidies to MTCR to build the railways, as an alternative they provide land grants that gives the company exclusive rights to develop the land above and next to the station. These grants ease the task of them having to compete for and buy land on the open market. They then sell these rights to the highest paying developer who builds on it according to TOD required land use, in order to effectively provide for the high densities in the city. The benefits of this include higher ridership due to an increase in densities at new developments, reduced sprawl, reduced air pollution and reduced energy consumption (Cervero, 2009).

There are five types of R&P projects found around 25 railway stations. They are named according to their built environment characteristics (Cervero, 2009):

- High-rise office;
- High-rise residential;
- Mid-rise residential;
- Large-scale residential;
- Large-mixed use.

More recently these areas have incorporated transit-oriented designs such as a wide range of amenities, physical integration of spaces and a high quality walking environment. It was also noted that due to the high quality of mixed-use designs and friendly pedestrian areas, the ridership of these TOD areas increased. Ridership increase had a public benefit of reducing traffic congestion and pollution. R&P areas are also places of desirable living, where people are able to live and run a business in the same building as many shopping centres are below residential buildings. Lastly, it was observed that R&P and transit oriented designs has an impact on housing prices. This statement is only applicable in certain areas of Hong Kong as many stations possess different characteristics and their surroundings possess varied characteristics, hence making this only true in some areas. R&P and TOD areas in Hang Hau and Tsing YI have relatively higher rental prices that non-R&P and non-TOD. The presence of both of them spurs real estate developers to redevelop old areas or non-R&P and non-TOD areas (Cervero, 2009).

Transit Oriented Development in a South African context

TOD has become one of the main transport planning strategies in South Africa. The concept as mentioned above consists of planning with a focus on reducing the use of private cars for transport and creating an efficient public transport service, catering to the majority (Bickford and Behrens, 2015).

In South Africa, the focus on transport planning has been to provide infrastructure for the car, however, many people use public transport (Bickford and Behrens, 2015). The challenge in South Africa has not been the inability to provide for the car, but the persistent apartheid spatial challenges where majority of the working class live in the periphery of the city and commute daily to the CBD for work (Bickford and Behrens, 2015). Twenty three years later, this is still the reality of many commuters in South Africa's Major cities.

An example of TOD implemented in South Africa has been the Corridors of Freedom in Johannesburg. It is a Bus Rapid Transit system running through areas of the city, from the South to North of Johannesburg. The areas where the bus runs through were carefully selected to be areas of development and densification (Bickford and Behrens, 2015). The expectation of the City was to have high density mixed use developments along the corridors. These developments have been slow. There have been some challenges with implementing the TOD such as lack of integration between developments and transport, as well as problems with redeveloping already developed areas along the corridor (Bickford and Behrens, 2015). There has also been no confidence from the private sector in the ability for the public transport to provide safe and reliable services across the entire city (Bickford and Behrens, 2015). The Corridors of Freedom project has not been able to reduce the dependency of cars as has been the case with international examples, but it has managed to provide transport to many people in the city (Bickford and Behrens, 2015).

With regard to TODs and South Africa, Wilkinson (2006) notes that legislation is aligned with that of TODs as it states that urban containment needs to be exercised, infilling approach to residential development needs to take place and development of corridors and nodal areas are aligned with transport priorities (Wilkinson, 2006). This agenda is underpinned by the commitment to overcome the socio- spatial fragmentation as a result of apartheid. It has created dysfunctional development patterns in urban areas which is a result of the planning of that era (Wilkinson, 2006).

The policies and legislation with regard to the urban passenger provision clearly states that public transport needs to be put first when looking at development of transport in South

Africa (Wilkinson, 2006). In urban areas there is a prioritization of linking corridor developments or public transport systems with compact city strategies. The 1996 White paper on National Transport Policy proposed providing urban restructuring and densification and efficient land use-transport interaction (Wilkinson, 2006). Wilkinson (2006) suggests that TOD presents a useful addition to the mechanisms that may bring about spatial restructuring but questions how precisely TOD may need to be implemented in order to address the conditions still present.

Barriers of Transit Oriented Development

When designing an area to be transit oriented, one may face barriers or challenges. These may include *policy barriers*. In South Africa for example, the development of land is guided by zoning, which indicates what specific land use may be built in a certain area. This hinders development in a TOD scenario, as it is mixed use with residential, commercial and services all located in the same vicinity. This poses as a challenge as these areas of land would need to be rezoned in order to develop them in a different manner set out by the government. Another example of policy would include the RSDFs and IDPs of the area. They have proposed visions and goals for an area and would require a revision of these plans in order to provide a mixed use development around a transit node (del Moral, 2009). Another barrier that a developer may be faced with includes the shifting land values; when an urban growth boundary is drawn, many landowners outside the boundary lose development potential and the value of their land goes down. They may oppose the TOD development. People inside the boundary may also oppose development as they fear an increase in densities would change the value of their properties (del Moral, 2009). A third barrier that exists is the areas economic condition.in order to have a successful TOD, the area in which the development takes place as well as its surrounding areas require growing and thriving economies in order for the development to reach its full potential. It is difficult to implement a TOD in a depressed market area as this leads to slowdowns in that area as well as high costs and risks with the new developments. Implementing a TOD in an area that id degraded in economic terms, will not necessarily revive the area, but instead put pressure on that area, which may lead it to collapse. It is recommended to develop a TOD in an upcoming or already economically stable environment so the benefits and success of it may be seen (del Moral, 2009).

Other barriers that may be faces include densities. This may be a challenge as it is difficult for developers and officials to decide and agree on the appropriate densities for the context

in which the TOD will be implemented. It is vital to get as many people as possible living and working around the transit node for it to be successful, but it is nearly impossible for municipal officials to realise this. There is the issue of NIMBY where people already living in the area do not want to densify their plot of land. Other challenges include zoning regulations, land not sold to developers and transit authority having its own views for the land it may own (Payton, 2010)

Diversity and design is a challenge faced when developing a TOD neighbourhood. It is common knowledge that a TOD must be considered in terms of the neighbourhood it will be implemented in, but aspects such as diversifying the area through urban design are sometimes difficult to implement. Diversity comes in the form of residential developments with various price tags, a mix of commercial and retail activity, and inclusion of some important amenities. It is difficult for developers to realise all these demands in an already built up neighbourhood. Very rarely TOD is developed in an empty neighbourhood where it can be designed from the beginning. It is usually implemented in an already designed neighbourhood. Nevertheless, it is not impossible to provide diversity; it just takes a lot more planning, negotiating and time. When designing the neighbourhood, developers need to keep in mind a few points. These include: a visible transit station whose design fits into the surroundings, streets and public spaces to add the feeling of community, parking that is available but not an eyesore in the middle of the developments (underground parking) and lastly, ensuring the developments do not create buffers but are developed organically from the station, moving outwards and upwards (Payton, 2010).

These barriers make it difficult for municipalities and developers to successfully plan and implement a Transit Oriented Development. However, it is not impossible to do so in a developed area already. It has been successful in Hong Kong and Curitiba and with enough planning and dedication from all parties, it is possible.

Conceptual Framework

From the literature review, there are two main concepts emerging which are property development and densification. These two concepts are heavily relied on by Transit Oriented Developments as they are the two main factors which make it succeed. The Midrand station should become a favourable environment in which development and densification can occur. For me to be able to measure the effect of these two concepts on the area, I will need to detail them into measureable factors in order for me to reach a conclusion. The following are

factors to look at in a specific radius with the station at the centre, in order to understand their effect:

- The change in property values
- Change in development and construction projects
- Land available for development
- Investments into the area
- Residential vs commercial developments
- Other influencing developments similar to the station

At the end of my research, I would like to see if the Gautrain has created an increase, decrease or has had no effect with regard to the factors mentioned above. This will help me understand the effects of the concepts.

Conclusion

The above literature review has shown that there is more than one definition of Transit Oriented Development, and that it may mean different things in different parts of the world. However, it is clear that they all focus on the fact that it should include a transit stop such as a bus or train stop, and have development spreading outwards from that transit stop. It has also shown that the land uses surrounding the transit stop should be mixed use to allow a variety of activities to surround the node. The distance between the transit stop and amenities or business and residential spaces should be within a 10-15 minute walking distance, and the transit stops should cater for park and ride facilities, especially if it a train stop.

The literature has also shown the impacts TOD has on property, the economy and surrounding developments. It is seen that property prices may increase or decrease depending on the context in which the development is created. It also showed us that TOD needs certain characteristics to work, and also includes barriers that may make it unsuccessful. These barriers may sometimes be overcome, and success may be reached within the development. Lastly the literature showed us the way TOD has been implemented in different countries and even though it is a concept that was developed in America, it is adjustable to different spaces and contexts.

CHAPTER THREE:

Methods of Research

Overview

The following chapter looks at the research method I have chosen. Looking at the outline of the research in chapter one and the literature gathered in chapter two, this chapter aims to outline the way in which the data will be gathered as well as how it will be analysed. It begins by looking at my research question and sub questions. Secondly it looks at what is qualitative research, followed by what are case studies. Following that are methods I will use for data gathering and how analysing data may be conducted. Lastly this chapter looks at ethical considerations and limitations to research. According to the literature review conducted in the above chapter, concepts such as Transit Oriented Development and Densification emerged. This chapter will look at how I can conduct my research in order to gather data and analyse it and see if the two concepts are present in Midrand which will assist me in answering my research question.

Research Question

Any research, whether in a big city or a small town, has an impact on its surroundings. The type of development and its magnitude will decide on the impact it may have.na football field in a suburb will have a positive impact on the youth of the area, as it allows them to spend their time playing football or other sporting activities. The same concept may be applied to an airport developed in a busy or upcoming city.it allows people in the city to travel, or make the idea of travel easy. Access to developments that have a positive impact on one's life is important, especially when that development enables mobility. Developing a transit station in an area adds value to that area, since it automatically becomes easily accessible if it previously was not. It also allows people living in the area to travel to other destinations using that transit facility. Developing a Gautrain station in Midrand has allowed it to become an easily accessible area from three different metros in Gauteng. But what does this station development mean for the area? This research will look at the impact the station has had on its surrounding developments and on general development in the area.

What is the impact of the Gautrain Station in Midrand on the surrounding developments in the area?

Sub-Questions

In order to help me answer the research question, the following sub-questions will be asked:

- What kind of property development is taking place?
- What has been the stations impact on property prices?
- Has densification taken place in terms of people and property?
- What changes is the Gautrain Precinct experiencing?

Qualitative Research

Qualitative research according to Kumar (1996) is to understand, explore, explain and discover situations, perceptions and feelings of a group of people towards a common notion or idea. The designs of the studies are based on deduction rather than induction and are flexible as well as emergent in nature. The qualitative method of research design is not as structured and sequential as quantitative designs because the scope of the study and the information gathering process is flexible and evolving. It is done through an open frame of enquiry which is then gathered and explored (Kumar, 1996). Schmid (1981) described qualitative research as a study of the world from the viewpoint of the person under study. Kirk and Miller (1986) went on to define qualitative research as “a particular tradition in social science that fundamentally depends on watching people in their own territory and interacting with them in their own language, on their own terms” (Kirk and Miller, 1986, p9).

Case Study Research

According to Yin (2003) a case study may be undertaken when the focus of the study is aiming to answer ‘what’ questions, when the researcher cannot manipulate the behaviour of those involved in the study and lastly when the researcher would like to cover contextual conditions relevant to the study. When looking at a case study, one must determine what the case will be and what the case will not be because it is a common pitfall in case studies where researchers attempt to answer questions too broad or questions that have too many objectives for one study. This is why Yin (2003) has suggested that placing boundaries on a case may prevent it from exploding into many other things that may not result in the case at hand being studied. He suggests that binding a case allows it to remain reasonable in scope. (Yin,2003).

There are many different types of case studies that a researcher may pursue. These include explanatory, exploratory and descriptive to name a few. Explanatory case studies as defined by Yin (2003) is a case study that is seeking to answer a question that sought to explain the presumed casual links in real life that are too complex for a survey. Exploratory is a type of

case study used to explore these situations that have no single set out outcome when being evaluated (Yin,2003), and Descriptive case study is when an intervention or phenomenon is described in the real life context in which it occurred (Yin, 2003)

According to Hodkinson and Hodkinson (2001) there are four strengths to a case study based research. Case studies can help us *understand complex inter-relationships.* Due to the fact that case studies operate with a restricted focus it is easier to understand the relationships that emerge from the collected data. This is because case studies enable the creation of an in-depth understanding of what is being studied. This in-depth understanding facilitates the possibility of case studies engaging with complexity (Hodkinson and Hodkinson, 2001:2). The second strength is that case studies are *grounded in "lived reality".* Case studies closely relates to the experiences of individuals and groups. They are an analysis and interpretation of what one has experienced when out on field or during their day-to-day lives. Case study research cannot exclude unwanted variables and therefore their content and conditions are always complex. In the end it comes back to peoples experience and lived reality (Hodkinson and Hodkinson, 2001:2). The third strength is that they *facilitate the exploration of the unexpected and unusual.* Case study research permits the examination of the typical as well as the exceptional. This is often excluded from other types of research as it does not focus on patterns and themes that need to be followed. With case study research, all information is vital and may be used to reveal other phenomenon the researcher did not intend on finding. This allows the researcher to scan a vast scope of options when presenting the data. It shows that anything can be found if looked for hard enough. Lastly, case studies *can facilitate rich conceptual/theoretical development.* The above factors show that case study research is fertile ground for conceptual and theoretical development. Existing and new theories may be brought up and this uncovering of new data can help create new ideas. It allowed the researcher to find new data, and then develop theories and research this new data which may present even newer data. Case studies enable many discoveries and that is one of the main reasons for it being one of the best methods to conduct research.

From the above it is clear that case study method of research is most beneficial when researching my area of interest and that it would be the best method to use to fully answer my research question. It is well suited to understanding the interactions between the Gautrain and the surrounding developments in Midrand. It can also be seen that the

Gautrain is an immoveable structure that may or may not affect its surroundings and therefore qualifies to be considered a case study.

Data Sources

Effective and efficient data collection is a crucial element of case study research and requires careful planning and meticulous analysis from the researcher (Darke et.el,1998) . Data collection may be difficult and time consuming. It is important to begin with a background of the study area in order to sufficiently prepare one for what they may encounter (Darke et.el,1998). It doesn't not make sense to approach a situation blind, but at least know the layout of the land before entering a particular location. Data sources need to be decided on and then carried out to ones best ability. In my research of the area I will be looking at four types of data sources in order to complete my data collection exercise. They are listed and further explained below.

Field survey - this method of data collection requires the researcher to visit the site in order to obtain data for analysis purposes (Kumar, 1996). It is the collection of data in the natural setting. It may be done in the form of general observation or face-to-face interviews. Field surveys are sometimes expensive and timely; however the data that may be collected from a field survey is invaluable and cannot be replicated in a lab setting. Field surveys need to be carefully planned and separated over a few weeks at different times of the day in order to get an accurate depiction of a scenario (Kumar, 1996). With the case of the Gautrain Station, there are times where it may be busy and times where it may be less busy. I would need to visit the station at different times of the day, on different days so as to eliminate the possibility of getting biased data.

Interviews- these are a common form of data collection. According to Monette et al. (1986, p156) "an interview involves an interviewer reading questions to respondents and recording their answers". Any interaction between two people which involves an exchange of a specific type of information is called an interview (Kumar, 1996). Interviews may be structured or unstructured. For the purpose of this study, I have prepared interview questions and will be using a structured interview format (for the questionnaire, see appendix A). One main advantage of a structured interview is that it provides uniform information which assures that data may be compared when looking at the results from other interviews. A questionnaire will be prepared and provided to the respondent when being interviewed.

Secondary Sources- this will be looking at data that has already been collected by someone else and analysed. I will need to extract relevant information from previously published literature. This will include government publications, earlier research, personal records and mass media. Governments publish data on a regular basis for use by the public and other interest groups. Earlier research on a topic may show me what has been unravelled from previous searches already. Personal records include people's diaries and journals that they may have written overtime documenting certain events. Mass media includes reports published in newspapers, magazines and the internet, and these may be a good source of information. There may also be some problems with such secondary data these include the fact that the validity and reliability of sources of information may vary, personal bias is difficult to ignore and lastly it is common for researchers to assume that the required data is available only to find out that it is difficult to extract or non-existent.

Mapping- this method of data collection is mainly based on records (Maps) from the City of Johannesburg database in my case, which have been collected over time. The chosen method of mapping is GIS Mapping. This will involve me analysing maps in order to look for certain elements such as property developments and physical changes on the ground. This will allow me as well as the reader to see what changes have taken place in the surrounding area.

Data Analysing

Data that has been collected needs to be organised and categorised in order to begin analysis and address the research questions. It must be well documented and kept safely in cases where confidentiality and anonymity is guaranteed. It should be organised in a way that it may be accessed and used immediately when needed. The reason for doing so is because when conducting research, one may be exposed to an overwhelming amount of data and this required management and analysis (Baxter and Jack, 2008). Computerised tools may help in this context.

Miles and Huberman (1984, p21-23) divide analysing data into three categories. They begin with data reduction which refers to critically selecting and simplifying raw data obtained and compiling it into workable material. The second category is data display which refers to converting selected data into narratives, graphs, charts and tables' in order to clearly see what has been obtained. The last category is conclusion drawing which refers to drawing meaning from the data displayed and building logical chains of evidence (Miles and Huberman, 1984).

The goal of analysis in research is to produce an understanding of different interactions and systems (Walsham, 1995, p78). It is done in order to process all the data gathered and extract a plausible conclusion in order to understand why certain things work the way they do. One danger that is expected in the analysis phase of research is that data is treated independently because it is collected independently. In the end, I need to be able to combine data in order to understand the overall case and not treat it as separate parts of one case (Baxter and Jack, 2008).

Ethics

Ethical issues present themselves in all forms of research. The research process causes tensions because one may be trying to find information and this information, most of the time, relies on people and their experiences. Ethics relates to doing well/good and avoiding harm (Orb et.al, 2001). Protection of people's rights and privacy is part of the ethical considerations that need to be followed. A violation of humans' rights in the name of research is considered unethical. With regard to qualitative research, the ethical problems exist in the way in which one gains access to groups of people or participants information. When qualitative research is dependable on examining and describing people and their opinions to certain aspects, ethical issues need to be taken into consideration (Orb, 2001).

The research that will be conducted requires ethical clearance from the School of Architecture and Planning. Before my research process began, I created a questionnaire (Appendix A) so I could apply for ethical clearance, which required me to state what my research would entail, to a board who granted me clearance to go ahead and begin my field studies (a copy of this is attached in Appendix B). Due to the fact that some of the research was interview/survey based, I was required to provide participants with a certain amount of information before beginning the interview/survey. The information needed included my name and an explanation as to why I was conducting the research. I also needed to let participants know that there would be questions based on their opinions that would be asked. The participants needed to know why they have been selected and that participation is voluntary. Lastly participants needed to know that the participation is anonymous and that no payment will be made to them for participating. Before conducting any interview/survey I presented them with a participation information sheet and a consent form in order for them to read and consent to being interviewed (a copy of these is attached in Appendix C and D). I informed them that I would guarantee anonymity for them and would not be using people's names or company names in the final analysis of the data collected.

Limitations to Research

Research, just like anything that is planned to be carried out has its limitations. The following are possible limitations a researcher may face when going out into the field to conduct case study research. It is based on Hodkinson and Hodkinson (2001) paper on Strengths and Limitations of Case Study.

1) *There is too much data for easy analysis*- case study research leads to researchers being swamped with data. However analysis is done to the best of the researcher's ability, including all that is necessary to answer the questions of research.
2) *Very expensive, if attempted on a large scale*- data is time consuming to collect as well as organize and analyze. Not only this but for researchers, actually getting to a site may cost money and at times this may not be available.
3) *The complexity examined is difficult to represent simply*- when case studies reveal complexities of situations, it is difficult to represent in tables and graphs like that of quantitative data. Qualitative research is best represented in pictures and writing.
4) *They do not lend themselves to numerical representation*- as mentioned above; it is difficult to represent qualitative case study data numerically. Because the sample size varies with different cases and some questions may not be answered in a survey, it may not be represented numerically.
5) *They are not generalizable in the conventional sense*- there is no way of knowing the exact outcome of a case study research. Because the data is non-numerical there is no way of determining the probability that the data collected is a representation of the larger population.
6) *They are easy to dismiss, by those who do not like the messages that they contain*- case studies present issues that are unpopular with policy makers. This tends to cause the researcher to be questioned about being biased or told that the sample set was too small to accurately study and present a conclusion.
7) *They cannot answer a large number of relevant and appropriate research questions*- case studies are not omnipresent and therefore it must be known that sometimes they may not be able to answer all research questions.

Keeping in mind all these possible limitations to research that one may encounter, it is not impossible to proceed with the research and obtain meaningful data that will allow a researcher to answer their questions.

Context

Midrand is located in Johannesburg, Gauteng. It's centrally located in Gauteng and lies between two of the busiest metros in South Africa.

Figure 3.1: Midrand demarcated by COJ. Source: Google Maps (2017)

Gauteng

Gauteng is the smallest province in South Africa and has approximately 24% of the population living in its boundaries (Provincial Treasury, 2015). It is the highest contributing province in terms of GDP and has the highest rates of inequality of income and unemployment. It has three metros, City of Johannesburg, City of Tshwane and Ekurhuleni, as well as two districts, West Rand and Sedibeng. The population of Gauteng has increased drastically since 1994 and this is the highest in the 15-45 age groups (Provincial Treasury,

2015). It is not a surprise that the highest number of the population consist of the working class, as many people immigrate from other province, in search of jobs and a better standard of living. High levels of poverty and inequality continue to grow as the number of people increase. Even though improvements have been made in human development, many people still live in abject poverty with a lack of basic necessities (Provincial Treasury, 2015). This is however, better than other provinces in the country, it is still a large number for a province who has the best outcome in terms of GDP. The province has made leaps in terms of providing basic needs and services to the population, and improving the socio-economic conditions. Although it takes time, they have made notable progress from 1994 and continue to do so (Provincial Treasury, 2015).

Johannesburg

Johannesburg is the largest economically thriving city in Gauteng. It has an estimated population of approximately 3 million (Rogerson, 2005). It is the provinces main transport and shopping hub with many options for public transport such as Rea Vaya, Gautrain, Metro bus, Metrorail and metered or minibus taxis to choose from. It is home to the Johannesburg Stock Exchange and the most expensive and developed square mile in Africa, Sandton. Johannesburg has also been the testing ground for many urban reconstruction projects since 1994 (Rogerson, 2005). It has an unequal balance of rich and poor in the city, with the rich competing in global markets, and the poor not having access to basic services. It is diverse in many contexts. The main aim of the City of Johannesburg is to balance the urban development in terms of planning for global competitiveness and planning to reduce poverty (Rogerson, 2005). There has been evidence of restructuring the urban economy since the 1980s as employment in the manufacturing industry has decreased. The decrease in employment in the manufacturing sector has decreased the overall employment in the city due to the de-industrialization that occurred. The rise in skilled base and high tech manufacturing has picked up but not enough to reduce the unemployment rates seen from this sector. Over the years, there has been a growth in employment in financial services, insurance and business services economy. Johannesburg, in this new century, has shifted focus from mining and manufacturing to banking, accounting, advertising and insurance. Business tourism and MICE has become an element of the economy. It is also has a geographical focus on the largest groups of smart and knowledge based activity with a particular focus on information and communications technology. As a whole, the economy of this metro is described as having waves of development and decline (Rogerson, 2005)

Midrand

Midrand is located between Johannesburg and Pretoria, as mentioned above. It is strategically located along the N1 highway stretching from the South of Johannesburg to the North of Tshwane. It is considered one of the fastest growing economic centres in South Africa during the last two decades (Thomlinson, 2003). It emerged as a location perfect for decentralised offices and high-technology enterprises in post-apartheid South Africa. It experienced economic growth which led to an increase in population in the entire area. The rapid immigration was due to a huge wave of job-seeking individuals from other parts of the country (Thomlinson, 2003). The increase of people in the area led to clustering of high-income and low-income neighbourhoods, just like many areas in South Africa. Midrand developed as the formal city centre and Ivory Park developed as the township neighbouring it.

The area is diverse with a variety of mixed use developments and a growth in IT and high tech activities. There has been a growth in the number of business and office parks which caters to a specific type of employment sector. It focuses on specialised employment in certain categories. It is also home to many large international companies namely, PwC, Lew Geffen/Sotheby's and Sanofi-Aventis (Rogerson, 2005).

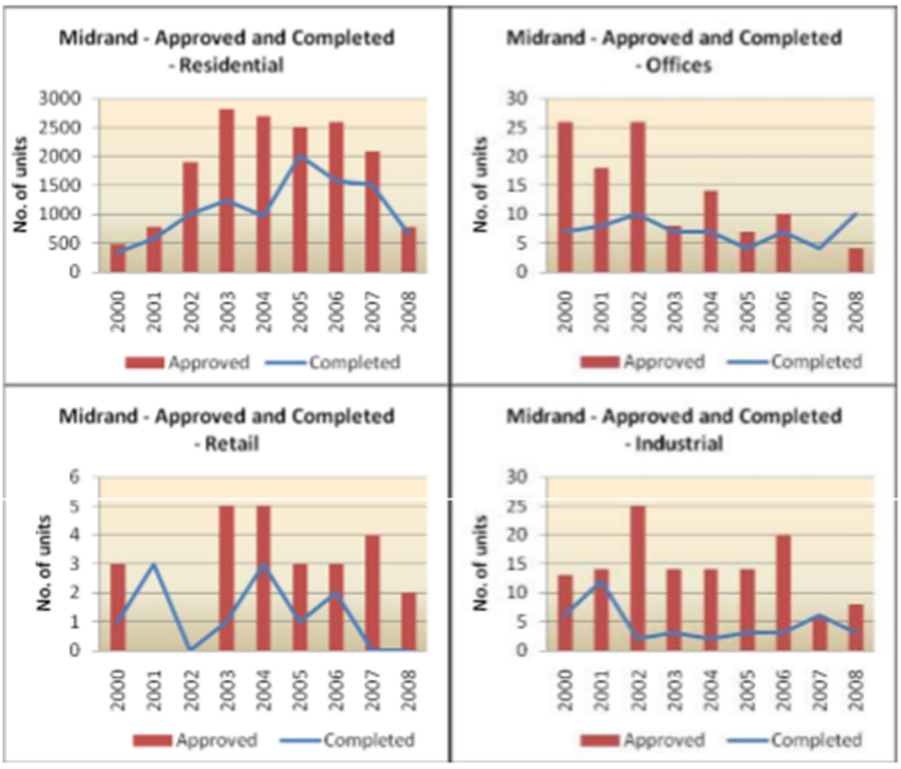

Figure 3.2: Growth in Developments. Source: Rogerson (2005)

From 2000 to 2009 residential developments in Midrand grew, with a peak in 2005. Most of these developments were complex or unit development. On an average, 25000m² of office space was completed from 2000 to 2010. There have been many applications for office plan approvals, as this area is most popular

with office complexes and blocks. There are not many stands of land zoned for office space, hence the rezoning applications. There has also been a growth in retail space, as 40000m² of retail space was approved and completed from 2004 to 2010. This is a significantly large space of developed land for a space of 6 years. Industrial growth was steady with a small peak in 2002 and 2006.

This growth in development and purchase of land influences future developments. The growth in the area was an influential factor when choosing a location for the Gautrain station. As mentioned above, the area has seen a great amount of growth in both commercial and residential properties. Many businesses have relocated to Midrand because of its proximity to the highway and its halfway location to two of the biggest booming cities in South Africa, Johannesburg and Pretoria (eProperty News, 2016).

Midrand is an example of the economic expansion that Gauteng has faced over the last 10 years (eProperty News, 2016). Due to the fact that it has become a key growth point to businesses such as Vodacom and BMW, it has created the notion that the area has the potential to be a strong indicator of growth. Naturally the Gautrain has assisted this notion as it provides access to the main areas in Midrand. It has opened up the area to both business and residential property buyers, as the commute to both metros is in reasonable driving, or train ride distance. Johannesburg and Pretoria have seen an influx of people over the years and the sprawl of people towards the periphery of the cities has increased. Midrand allows for residents to live in a neutral location and not be in the centre of the hustle and bustle of two thriving busy cities. According to Bruce Swain, MD of Leapfrog Property Group, “the town council has estimated an average of around 600 people moving into Midrand per month” (eProperty News, 2016).

Conclusion

This chapter outlined the required research methods that I needed to use when conducting the data gathering exercise as well as limitations that I may encounter. It opened up about the ways that I intend to gather data. It also assisted in how I may handle data and ways that may be used to analyse it. Lastly it looked at my ethical obligations. The above chapter is a guide that helped me conduct my research which will be represented in the next chapter.

CHAPTER FOUR:

Analysis of the Station and its Surroundings

Overview

This chapter is the analysis of the data collected from the four sources mentioned above. These are grey literature, field survey, interviews, and GIS mapping. The aim of this chapter is to uncover the impact the station has on its location. It will begin with a layout of the land and a look at the surrounding developments that have an impact on the Gautrain. It will then look at the grey literature available from online sources and government publications. Next it will look at my personal observations of the station and my interview sessions I conducted during my field work. The chapter also looks at GIS mapping and limitations to data collection I experienced. Lastly it looks at proposed TOD contributions and future plans for the Gautrain Precinct in Midrand.

Layout of the Land

The land layout in Midrand, especially that surrounding the Gautrain Station is unique. For one, the high income areas are located on the periphery of Midrand which is noteworthy, as many suburbs around Johannesburg house the low-income residents at the periphery. These high-income areas include Kyalami Estates, Randjiesfontein and Glen Austin Suburbs. They are mainly walled estates. Middle income suburbs include Halfway Gardens and Vorna Valley. These are located towards the West of the Gautrain Station. They include single dwelling residential and walled townhouse developments. In the CBD, some middle income residential units have been developed. Townships and disadvantaged areas are situated at a distance and are isolated from urban developments. They are part of the historical legacy. These include Ivory Park, Ebony Park and Kaalfontein which are situated at the east of the Gautrain Station (Arup, 2008)

In terms of retail, this is situated in pockets around Midrand. There are some retail nodes such as Carlswold Lifestyle Centre and San Ridge Square to the West of the Station and caters mainly to the residents in surrounding areas. In the CBD Boulders Shopping Centre is the main Retail Centre. Informal trade is limited in the area and occurs mainly in the CBD and around the main taxi ranks. There is no informal trade in the formal economic nodes (Arup, 2008)

Offices are located in the CBD, in office parks, retail areas and some industrial areas. Midrand has become a popular location for office blocks and conference centres. It has become a location where many businesses prefer to set up, or relocate to, due to the location being central and the abundance of other offices, making it suitable for them to cluster together (Arup, 2008)

Industrial activities in Midrand have been classified as lightweight. They include pharmaceutical, electronics, motor and ICT. Grand Central Airport has some aviation activity, but this is light weight as well. It includes airplane repairs and piolet training. There are a number of agricultural holdings located in Midrand. These have been converted to complexes and apartment blocks. There are a few plots of open, unused agricultural land that is not being used (Arup, 2008)

Social amenities are located in and around Midrand, abundantly near the Gautrain Station as well. These include Educational facilities of both primary and secondary, both having public and private options, and two tertiary institutes, Midrand Graduate Institute and UNISA Business School. There are a number of clinics and one private hospital in Midrand. There is one main police station located in Randjies Park with smaller satellite stations in surrounding areas. The main public library is located in the CBD. Lastly, there are no major sporting facilities; however the Swiss Club and Eskom Sports Ground are smaller private spaces (Arup, 2008)

Surrounding Developments

Figure 4.1: Grand Central Airport. Source:www.grandcentral.co.za

1.Grand Central Airport is a privately owned airfield in Midrand that opened in 1937. It is located half way between Johannesburg and Pretoria. It is a fully equipped airfield and is opened 24 hours a day. It is the base of numerous private flying schools. It is equipped with a terminal building but lacks customs facilities. It provides maintenance and repairs for light aircrafts and helicopters. It is also opened for emergency landing but is restricted to light aircraft only (Grand Central, 2010)

Figure 4.2: Premier Hotel. Source: www.PremierHotel.co.za

2.Premier Hotel Midrand is located in Halfway Gardens, Midrand. It has 113 rooms and a state-of-the-art conference centre that is ideal for corporate events. It is centrally located in Midrand as it is only 3km

away from Gallagher Convention centre and estate, 6km from Mall of Africa and 24 km from O.R.Tambo International Airport, should one wish to drive there.

3.Gautrain Management Agency is a part of the Gautrain Provincial Government with its head office located directly opposite the Midrand Gautrain Station. They manage, coordinate and oversee any developments or issues related to the Gautrain. They take charge of everything related to ensuring the Gautrain Vision is achieved along with its goals and objectives (Gautrain Management Agency, 2012).

Figure 4.3: Gallagher Estate. Source: www.GallagherHotel.co.za

4.Gallagher Estate established in 1993 as a multi-purpose convention centre. It is located in the heart of Gauteng. It has a variety of multi-purpose venue options. It is on the Gautrain route with a bus stop bust outside the main entrance allowing guests from anywhere to easily access it without a vehicle. It also provides a link to O.R. Tambo International Airport for guests from overseas to take part in events at the venue. Gallagher Estate is serviced by Gallagher Hotel in terms of residential purposes for guests visiting the centre. It is a three star hotel and offers 104 single and double rooms with 8 inter-leading rooms (The Gallagher Hotel, 2016).

Figure 4.4: Midrand Business Park. Source:www.mbp.co.za

5.Midrand Business Park is an office park in the heart of Midrand. It is an area that is easy to get to as it is close to the N1 highway. It is a modern property with 24 hour security. It offers clients a variety of property options with both warehousing and industrial property. It also includes office space for

small and large companies. It is located opposite Birchfield Apartments which is an apartment complex with a variety of residential real estate options.

Figure 4.5: Birchfield Apartments. Source: Development Services (2017)

6.Birchfield Apartments is a 204 residential apartment development that is located 1 km away from the Gautrain station. It was developed after the implementation and running of the Gautrain. It is across the roads from the Midrand Business Park which allows workers and employers to live and work in the same area. It provides one and two bedroom options in a well sought after area. The surrounding land has been identified and planned for commercial developments, which allows this apartment complex to be part of the supply for the residential demand in Midrand (Development Services, 2017)

Figure 4.6: Zonk'izizwe. Source: Venter (2007)

7.The Old Mutual Zonk'izizwe Development is a mixed-use development also located near the Gautrain. "Zonk'Izizwe represents a new era in urban development in South Africa," says Wiltshire. "It will offer South Africans an opportunity to live, work and play in an environment close to public transport routes, and with a direct connection to an international airport (OR Tambo) as well as access to a regional airport (Grand Central)." (Wiltshire, for Gautrain, 2007). The project will be on 350 hectares of land and include retail, residential, industrial offices and parking bays for the Gautrain. The station was meant to be an underground station, but after negotiations between Old Mutual and the Gautrain Management Team, it is above ground, in order to be incorporated into the development. The land was purchased by Old Mutual in 1987 and awaited the right time for development. The project is what the Gautrain Management Agency and Gauteng Provincial

Government were promoting to be located close to stations. It is a mixed use development in close proximity to a transit node. Unfortunately this project was never developed due to issues such as land approvals and the high cost of the development, which has resulted in the station lying in isolation next to a piece of bare land (Venter, 2007).

Grey Literature

What has been said about the Gautrain?

In February 2000 it was announced that the new Gautrain Rapid Rail Link between Johannesburg, Pretoria and O.R.Tambo International Airport was one of the 10 Spatial Development Initiatives that were to be implemented in Gauteng (Gautrain Management Agency, n.d.). A consortium of consulting companies was appointed for the execution of the project. This project was unique as it was the first modern rail systems in Southern Africa. The concept phase outlined many aspects of the project. It was intended to reduce the vehicle traffic on the N1 between Johannesburg and Pretoria. It mentioned that there would be feeder and distribution services at each of the stations as well as park and ride facilities (Gautrain Management Agency, n.d.). It is not a stand-alone project, but part of a holistic transport system in Gauteng. It is not meant to compete with other public transport services. Lastly, the stations will have provisions made for commercial and other development opportunities, to add value and additional income. Densification around the station is important for its success (Gautrain Management Agency, n.d.). The project has many positive aspects linked to it that have been mentioned in chapter one. Below are some considerations that need to be addressed.

A general evaluation was conducted on the project and the outcome included many considerations that still need to be addressed. These include the fact that the Gautrain project is primarily a project aimed at economic development, growth and job creation. The secondary aim is to alleviate traffic congestion. So even though the Gautrain is a transit project, the major focus is what it was going to do for the areas, and then what it can do to improve traffic congestion. Aspects such as economic development and job creation are spin-off effects of a successful transit node, and these need to be achieved. However, this is not the reason for creating a transit project. Its primary aim needs to be to alleviate traffic or mobility and accessibility issues. The aims of this project need to be re-evaluated if its main focus is not transport focused. An aspect that the Gautrain is supposed to achieve is economic generation. This is meant to address poverty and limit the number of people dependent on welfare. Gautrain is a relatively small project in a big province, and it is not

able to generate enough income and development to address poverty. It has created jobs and developments have occurred along the routes, but these developments and station nodes are far away from where the low-income population live. The jobs that have been created are specialized jobs and do not address many of the unemployed people in the province. It is unfair to rely solely on one transit project to alleviate poverty and reduce the demand for welfare in Gauteng. Lastly the Gautrain project is part of a policy enactment to provide public transport. This design for public transport does not include access to many places, and is expensive to use. From the pictures taken outside the station, and which is present in many other stations, people still have to drive to the station and park their car in order to use the train. It has not been created so that people do not need to use their cars at all. People are still very dependent on the use of their motor vehicles and the concept of transit developments and sustainable public transport has been lost.

The City of Johannesburg's RSDF (2011) for Administrative Region A has set out the Gautrain Station as a priority area. The main objective of the Gautrain at Midrand is to reduce traffic congestion, encourage pedestrian movement, attract investment, encourage mixed economic activities and promote high-density residential developments. Opportunities that are present at Midrand Station include a good transportation network, a large number of vacant lands suitable for development, presence of both urban and rural character and mixed land uses ranging from economic and residential, to social and recreational.

Some constraints that the City have noticed include infrastructure constraints as the area is still in the process of becoming fully developed, low densities to sustain major nodal development, deteriorating urban environment and limited public transport facilities. The City has provided interventions in order to correct the constraints and enable the station to be a fully developed node. These interventions include support high residential development around the station, support the establishment of a formal trade market, improve public transport facilities, encourage pedestrian links and cycle lanes, encourage a sense of place around the station and lastly upgrade bulk infrastructure such as storm water drains, road infrastructure and the public environment.

Mobility is the key to future economic growth (Gautrain Management Agency, N.D). In response to this proposed increased growth, the Gautrain has been developed to serve the growing province and its economic growth. It is considered one of the several government projects to meet future land use and transport needs. It will assist the Province to establish itself as a globally competitive city region. New urban form is beginning to take place near stations. It will allow economic mobility within Johannesburg, Tshwane and Ekurhuleni (Gautrain Management Agency, N.D).

Adding Value to Gauteng

The construction of the Gautrain has piloted a new era of economic activity in the areas surrounding many of its stations. Areas such as Rosebank and Midrand have been able to accommodate the increase in demand for letting space (KPMG, 2014). Many international firms have located closer to the Gautrain for ease of accessibility and convenience for their international partners and higher productivity. These include Ernst & Young and Alexander Forbes who located near the Sandton Station (KPMG, 2014). Midrand, Rhodesfield and Centurion stations were developed in less established areas in order to give way to future developments and densification that is present at Sandton, Rosebank and Park. This increase in development can be seen as the parcels of land bought around the stations since it was commissioned have increased (KPMG, 2014). It can be seen in the graph below that the impact of the stations on a 2km radius from each of them has positively impacted the property prices. This has made the demand for them increase and the number of developments surrounding them increase as well.

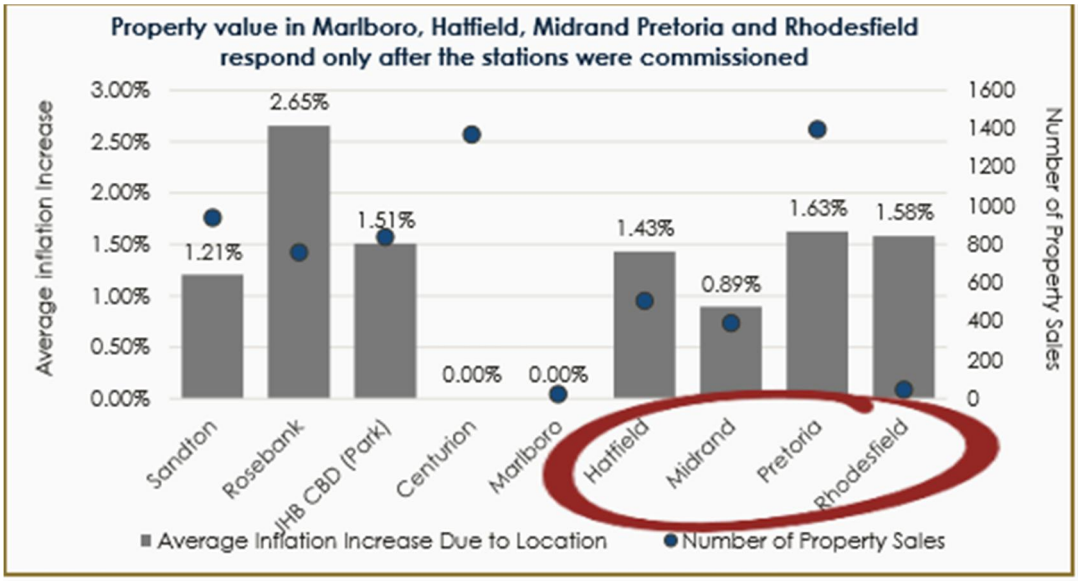

Figure 4.7: Property Value around Gautrain. Source: GMA (n.d.)

Policy applicable to Midrand Gautrain Development

The following policies are applicable for the Midrand Gautrain Development Node. These are policies that need to be taken into consideration and adhered to when developing the transit node and its surrounding. The Gautrain Station and its surrounding developments are to develop in such a way that they are able to fulfil the goals of the different policy documents

that affect the area (Arup, 2008). The following policies are adapted from the Urban Development Framework drawn up by ARUP in 2008 as part of a future TOD development document for the Midrand Gautrain Station.

National

1. National Spatial Development Perspective (NDSP, 2006)
   The goals of this policy include creating economic growth and employment creation in the area, supporting the restructuring for competitive performance in Midrand, encouraging local potential development and addressing the apartheid city development.
2. Breaking New Ground (BNG, 2004)
   The goals of this policy include ensuring property can be easily accessed by all, allowing property to be a leverage of growth in the economy and combating crime, promoting social cohesion and improving quality of life for the poor.
3. National Transport Policy
   The aims of this policy is to provide safe, reliable, efficient and integrated transport that is economically and environmentally sustainable and accessible to all, to invest in transport infrastructure to meet the needs of all customer groups and to support the RDP initiative.

Provincial

1. Gauteng Transport Infrastructure Act
   The primary principle of this act is to provision for the planning, design , development and management amongst other things, of the provincial roads, railways and other transport infrastructure, so as to provide efficiently and effectively to all consumer groups.
2. Gauteng Planning and Development Act
   The main principles of this act are compacting development, optimising use of existing infrastructure and ensuring safe utilization of land.
3. Gauteng Spatial Development Framework
   The guiding principles of this framework include integrating land-use types, integrating physical, social and economic aspects, encouraging environmentally sustainable development and correcting distorted settlement patterns.

Local

1. Growth and Development Strategy 2006
   This strategy promotes absorption of the poor into the economy, balanced and shared growth and sustainability
2. Spatial Development Framework 2007/08
   Interventions promoted by this framework include containing and compacting Johannesburg City, promoting economic growth in all areas of development and growth in new areas in terms of housing and services.
3. The Integrated Transport Policy 2003-08
   This policy guides all development focused on transport in the city. Its focus lays on achieving a functional movement network between urban transport and use planning.
4. Integrated Development Plan 2007/08
   this is the main development strategy in the city. SDF's and ITP are integrated into this policy. It focuses on allowing social growth and mobility, economic growth that ensures shared benefits and environmentally sustainability of local resources.

The above mentioned policies, although state many things that need to be achieved, do not state how each of them are going to be carried out and performed on the ground, which creates a barrier between policy and practice. Policy outlines are a guideline, and there is need for physical plans in order for these policies to take effect and be laid out.

Socio-Economic Context

Surrounding the station, especially to the east of the station, are many areas that are economically and spatially marginalised. They include aspects of high unemployment, low-income residents as well as low-income accommodation, informal businesses, pockets of undeveloped vacant land and being spatially disconnected from the main economic area of the region (Arup, 2008)

This area is know is Greater Ivory Park and consists of four small township/low-income areas clustered together. The Gautrain station as seen in the image, is located far west of this settlement and next to the Midrand CBD (Arup,2008). Development surrounding the station is guided mainly by the City's SDF which states that there should be economic growth and development, upliftment of poor communities and densification near the station. It also states that there needs to be strong linkages between areas to allow equal access to services and amenities. Unfortunately, the Zonk'izizwe development creates a buffer

between the CBD and Greater Ivory Park, excluding many residents there from economic and social opportunities. A major challenge the Gautrain has faced is making a contribution to the upliftment of the communities surrounding the station as it only serves a small percentage of the population. There is need to create better integration between the station, CBD and Greater Ivory Park (Arup, 2008)

Figure 4.8: Greater Ivory Park. Source: Arup (2008)

Gautrain Buses Midrand

Each Gautrain Station is equipped with a bus feeder system that provides a shuttle service to certain areas surrounding the station. Most stations have between two and six bus routes. Midrand Station has four Gautrain Bus routes. These provide services to four different areas. The buses run from Monday to Friday, from 6am to 8pm. However, there is one weekend bus from Midrand Station that services passengers from the station to Mall of Africa. The bus routes have been chosen strategically to serve economically thriving areas with centres of services as well. This is why along many of the routes there are residential areas, shopping centres and business areas. It allows people to work, live and shop in and around the same area. It has been noticed that even though there are four bus feeder routes, they all service areas to the west of the station. There are no buses that travel to the east of the station. Could this be due to the fact that it is a low-income area with townships? The following are the bus routes that serve the Midrand area and the major nodes and businesses they stop at. (Images of the bus routes are attached in Appendix E.)

The M1 bus route serves Randjespark. It travels up North away from the station. The route mainly serves the office parks in that area. It travels from the station past the CBD and small shopping centres such as Boulders Shopping Centre and China Town Mall, past Halfway House Estates and up to New Road. It then crosses over and drives past car dealerships towards the many office parks making a loop around the top of the road and back down 16th road to the station. The trip takes approximately 20-30 minutes to travel the full route and stop at all 17 stops along the way.

The M2 bus route serves the Noordwyk area. It travels in a North-West direction. As it drives out of the station it passes the CBD and drives west towards UNISA SBL and Halfway Gardens Suburb. It passes Midrand Police Station and goes up North towards New Road. It passes Carlswald Shopping Centre and crosses over to pass San Ridge Square, another shopping complex. It travels further North towards business such as Jacaranda FM, Vodacom World, Protea Hotel and Katara Guest House. It makes a loop around the block and travels back South towards the Station. This Bus route is on the left of the N1 highway and the bus route M1 serves the right side of the main N1 highway towards Pretoria.

The M3 bus serves the Sunninghill Suburb which is located between Rivonia and Midrand. It travels in a South-West direction from the station. On its way to Sunninghill it makes 17 stops, and 11 on its way back to the station. Its stops include in order, Gallagher Estate and Convention Centre, Trans African Concessions, Mall of Africa and Waterfall City Hospital. It continues down Waterfall Drive towards Woodmead. It passes these Major retail Outlets and arrives in Sunninghill. There it stops at Sunninghill Village which is a shopping centre and a stop at Eskom Megawatt Office Park. It goes west onto Witkoppen Road towards Sunninghill Hospital where it stops as well. It then passes by PWC Sunninghill offices and goes past Chilli Lane Shopping Centre which is its turning point. It drives back up Maxwell Drive towards the station, passing Mall of Africa and Gallagher Estate again.

The M4 bus is a new route that was introduced in 2014. It is tailored specifically to serve the Mall of Africa. There are two routes. One is a weekday route and the other is for weekends and public holidays. It travels in a South West direction as well. On weekdays it uses the R101n route with the first stop being the Turkish Mosque. It goes towards Waterfall Logistics Precinct, Waterfall Hospital, around the mall, back up the Logistics Precinct and up to the station making its last stop the Mosque. The full route takes approximately 20-30 minutes depending on traffic and the number of people using the bus. It has 11 stops on this route. On weekends and public holidays the bus goes through Richards Drive and makes a stop there before going to the Turkish Mosque which then follows the weekday route and back up

on Richards Drive towards the station. This route has 13 stops, including the two on Richards Drive.

First Impression of the Station

The first time I visited Midrand Gautrain Station was on the 24th of January 2016 at 10am, when I needed to go to one of the office parks in the area to repair my laptop. Before going to the office park, I researched different ways to get there which included using an Uber and a taxi. I came across the Gautrain Bus route when I was deciding and saw it passed the office park I needed to visit. My decision was made. On a mid-Monday morning I took the Gautrain from Rosebank to Midrand. Having used the Gautrain before to travel from Rosebank to O.R.Tambo International airport, I was familiar with how busy the different stations on the way were. So I expected the Midrand one to be just like Rosebank or Sandton. When arriving at the station, not many passengers exited the train. This was normal to me as it was mid-morning and therefore not peak time. When I exited the station, it was very quiet. There were very few people and cars outside the station building. The buses were parked and ready to go. I found the bus I needed to get on and waited. Three other passengers boarded the bus and we left the station.

Driving out of the station was unlike other stations I visited, as the activity on the road was very little with no pedestrians at the time. This was the first time I noticed that the station was isolated from everything. It did not resemble Rosebank, Park or Sandton stations at all. Those stations open up into pedestrians, walkways, main roads and shops. We drove for approximately 2 minutes and reached our first main road and sight of other pedestrians and cars. The bus drove through a busy commercial area and then a quiet road which opened up to what I thought was the heart of the area. It was busy and thriving, with a mix of different businesses and activities. The bus entered a road which was filled with office parks. I exited the bus and conducted the business I needed to do. At the end of it, I got back on the bus to the station, drove the same route back to the isolated train station and returned to Rosebank Station.

This trip made me question why this particular station was so different to the others I had been to. I understood that each place is different and unique but to have such a great transit node with no nodal activities taking place was unique. I left it and didn't think about it for a while. When deciding what topics we would like to research for our course, transport was the first thing that came to mind. I am passionate about transport, how people move and how different transport modes affect people and places. When I decided on the Gautrain, Midrand was the first station that popped into my mind. I immediately remembered how

peculiar I found the station and then a thousand questions began roaming around my mind. These included why the fact that Gautrain put a station in Midrand, and why there in that location. I also wondered how it has changed the area, and if it has affected the surroundings. This is how my research question was formulated.

Field Survey

The second time I visited the station was on Monday 17th of July when I began my field work after obtaining ethical clearance from the School of Architecture and Planning. I visited the station in a car and not using the train. I wanted to drive around the area and see what the environment was like, as I had only travelled on one of the four bus routes before. Driving up to the station was a little different than when I was driving back in the bus the first time. There were many cars parked along the long road from the traffic light to the entrance of the station.

Figure 4.9: Outside Gautrain Station. Source: Surti (2017)

Entering the station was just like the first time. The station was quiet with approximately 7-9 people standing outside waiting for transport. The busses were neatly parked, waiting to transport their passengers along their designated routes. During this trip I did not enter the station building as I was doing a general drive by to see what the area was like. So I turned around and drove out the station.

Figure 4.10: Midrand Business District. Source: Surti (2017)

I drove straight past the traffic light and down a road into the same busy commercial area I had gone to before. This area resembled Johannesburg. There were many pedestrians waiting for public transport and informal traders walking around. It was not a well-maintained area. This time I took a different route and drove around the vicinity. I saw a few small shopping complexes that I had not seen.

Figure 4.11: Office Park. Source: Surti (2017)

I decided to go up the road to the office parks I mentioned above. These were all busy with customers driving in and out. The area next to the office parks was a high income residential and commercial area and could be seen from the change in the way the area was managed. There were signs for private schools, gated complexes and a shopping mall that looked inviting.

Figure 4.12: Apartments in Midrand. Source: Surti (2017

There were exclusive cafes and artisan shops as well as small shops selling specialised products. The change in setting did not shock me but could definitely be noticed when going from one area to the other. This visit to the area was mainly to see the type of development around the station. I made sure to document my observations and also to choose my areas where I would like to conduct my interviews.

The next visit, a week later, I made was exclusively to conduct interviews with businesses in the area and having driven around before I knew where I wanted to visit so I may interview people in many different places from different places of residence and employment. This experience will be documented below in the interview section on this chapter.

Interviews

The day I set out to interview people was the 26th of July. I had the expectation that everyone I would approach to interview would be willing to partake in the interview and I would receive all of them in one day. Having visited many areas surrounding the train, it became very difficult to secure interviews with people and those willing to partake in my

questioning weren't many people who used the Gautrain. Nevertheless, I spent an entire day going from business to business trying to get people to talk to me.

My first stop was a small CBD area in Midrand (Kerk Street) where I attempted to conduct two interviews. The respondents who spoke to me told me that neither them, nor the people they knew who worked there, used the Gautrain. His reason for this was that the station stops that are currently present are not anywhere close to where he lives and it would not make sense for him to use the train. He also mentioned that it was cheaper for him to use a mini bus taxi that he could get on close to home and be dropped off close to where he worked. The second respondent said that it was too expensive for him to even try the Gautrain as he would much prefer to use his hard earned money on is family and for food and a cheaper means of transport such as Metrorail and then a mini bus taxi. It was not the response that I had expected as I was of the impression that many people to use the train in that area, especially because it was the closest to the station.

I moved to another area near the station (China Town Mall) and managed to secure another brief conversation with a respondent in a shop. He was an owner and was there from nine to five daily. When I asked him if he would answer a few questions for me he refused. His reasoning for not participating was that he had a bad experience with someone who previously interviewed him as they harassed him constantly for three weeks after the interview. I asked him if he used the Gautrain and his answer was "no". This was the end of my conversation. His neighbour was the next person I visited to try and secure an interview, but they could not speak English. When I approached him I introduced myself and explained what my research was about but received no verbal response. He gestured with his hands that he did not understand what I was saying. I found this peculiar as it was strange that a man owned a shop in Midrand, in a busy complex, but did not speak English. How did he converse with is customers? I understood that I could not push him any further or force him to answer my questions so I decided to move to another location.

I went on to another shopping complex (Boulders Shopping Centre) to interview employees. I secured an interview with a lady who owned and worked in a shop there. She agreed to the conditions of the interview and consented to me using her gender when relating this interview. She mentioned that she lived in Midrand in a complex West of the shopping centre with her children. She lived about 15 minutes away from where she worked in peak hour traffic. She said that her shop has been opened for a while now and she has noticed a change in the area in terms of development and activity. She said that the area has grown in popularity in terms of families moving there to be closer to schools and work, and a lot of new companies have moved in to the different office parks as it is an easily accessible area.

She had lived in Gauteng all her life, but moved to Midrand approximately 15 years ago. She said when she had moved there it was a very quiet area with minimal amenities and activities. Now there are many businesses and shopping malls opening up, as well as schools and churches. She said that since Mall of Africa has opened, she has noticed a lot more pedestrian and vehicular traffic in certain areas. She also mentioned that since Waterfall Estate opened, a different crowd of people have moved in to the area. She said she has noticed the prices of real estate have increased in the area as both her shop and house rental has increased steadily over the years. She mentioned that since the area is being developed, and becoming a more sought after location, it is becoming more difficult to find cheap accommodation. She said that she did not use the train on a daily basis as she lives closer to where she works, but she knew a few people who do use it and have agreed that it is sometimes easier and more convenient to use the train then to sit in traffic for hours on certain days. She has however used the train a few times to get to Rosebank and O.R. Tambo International Airport. This concluded my interview with this lady.

These respondents were chosen as they were close to the station. I decided to then widen my search and drive further away from the station towards an area where there was more activity, the office parks and its surroundings. I drove up 16th Road, to a busy New Road.

I began visiting many small offices around the area and managed to conduct some interviews with employees at companies. These were where they were able to sit down and answer my questionnaire. At other places I was able to have short conversations with people about the Gautrain and how they thought it impacted or changed the area. The results of five questionnaires I conducted are varied as everyone has their own opinions about Gautrain and Midrand based on their different life experiences. The results to some of the questions are presented below.

The results of the interviews show a general positive reaction towards the Gautrain. None of the businesses that I had visited moved to Midrand because of the Gautrain, as they were opened and running before the train. All of them agree that since the Gautrain, land prices in Midrand have increased. They also believe the number of businesses in Midrand has increased. These may not be businesses right next to the train but along the bus routes.

Some respondents felt that even though the Gautrain may not affect them personally, it has had an effect on the area and it is slowly changing the area. It may not be the sole reason for change, but is definitely one of the reasons. Two respondents did not know much about the residential patterns in the area as they travel into Midrand for work only. They have however noticed that traffic has increased and related that to more people living in the area.

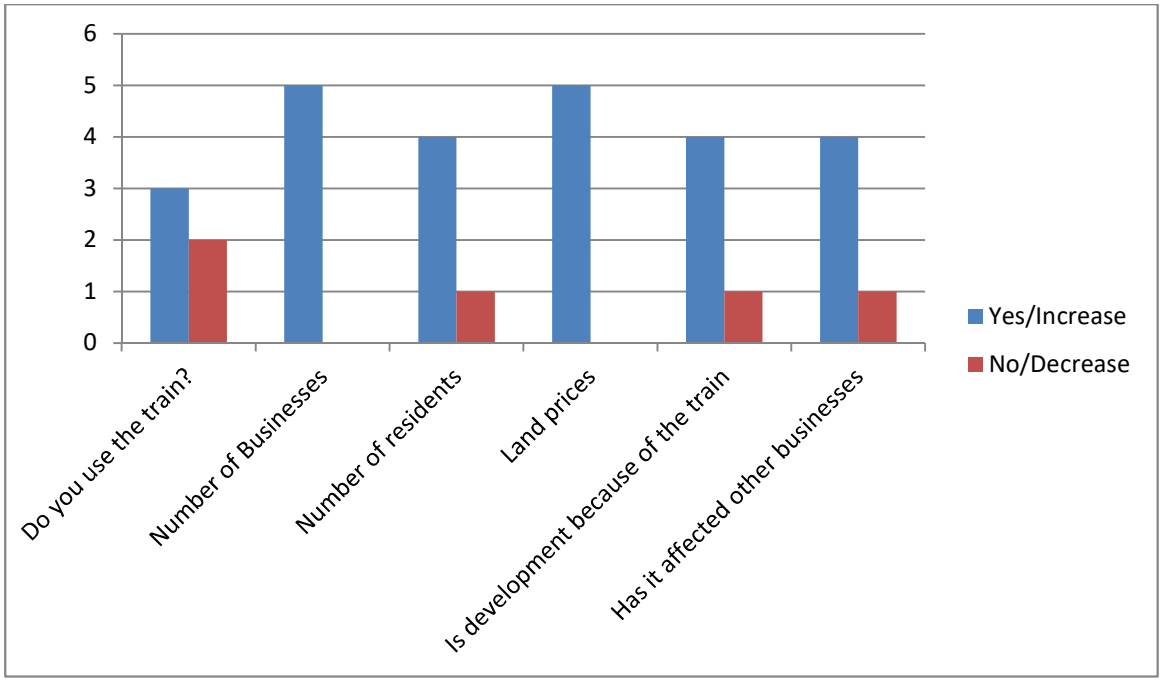

Figure 4.13: Results of Interviews. Source: Surti (2017)

Only one of my respondents said that businesses may move to Midrand solely because of the Gautrain. They said that Midrand is a thriving area and if they owned a business, they would definitely open it in Midrand close to the train. They said that it would make it easier for their clients as well as workers to get to them.

One respondent lived and worked in Midrand. They said that they have seen Midrand change and urbanize in the last 10 years. It may not only be because of the Gautrain, but many companies consider it a positive influence instead of a negative one when deciding to relocate or locate in Midrand. They said that having a Gautrain station in Midrand may not look like it is has changed the area, or helped it to grow much now, but it will take time to grow and even though the development is slower, the area is definitely growing. Unlike the Sandton station that received great press immediately, the Midrand station is slowly picking up and will soon be like Sandton.

One of my respondents was not as enthusiastic about the Gautrain as the previous interviewees and had not much to say about it except it's there and some people use it they had used it a few times and said after that they did not use the train and only use their car. Upon asking them why this was the case, their reasons were that the train was very crowded at peak times. "It is more comfortable to drive in an air conditioned car than to be squashed between many other standing passengers in an un-air-conditioned train for 20 minutes" (Respondent 7). They ride from Rosebank to Midrand and said it was very unpleasant. The

other reason was that it is very expensive for them to travel two trips daily on the train and still spend money on fuel to drive home. “The train prices have increased since it started and it is catering more towards the rich every time, losing potential customers who find it convenient, but too expensive” (Respondent 7). Lastly they mentioned that the train does not serve many areas, even considering the bus routes, which would make it difficult for others to go to work, then go and get groceries or enjoy some entertainment before going home.

GIS Mapping

This section looks at the changes overtime of the Station and its surroundings. It looks at timeline from 2006 to 2015. Marked in red is the station precinct and in green in the new developments between the three year gap on each image.

Figure 4.14: 2006 Aerial Views. Source: COJ eServices (2017)

This image shows the area surrounding the Gautrain Station. It is an aerial image taken in 2006 when the Gautrain was commissioned. This image shows the developments around the proposed station are very few. The land is bare and there are many empty parcels of land in the area. The Grand Central Airport is a prominent development in the top right hand section.

Figure 4.15: 2009 Aerial Views. Source: COJ eServices (2017)

This image is of the same area but was taken in 2009, three years after the station was commissioned. In this image it is clear that the station land has been demarcated and development of the station has begun. It can also be seen that directly across from the station, some apartments have been developed.

There is development in areas to the west of the station.

Figure 4.16: 2012 Aerial Views. Source: COJ eServices (2017)

This image is again of the same area but was taken in 2012. The station development has progressed and in this picture, the station was in operation. It opened in August 2011 as part of the second phase of the Gautrain. There are a few new developments on the west of the station.

Figure 4.17: 2015 Aerial Views. Source: COJ eServices (2017)

This image was taken in 2015 and here the station was in operation for four years. The Old Mutual plot of land next to the Gautrain Station has been vacant land since 2006 and continues to be undeveloped land. There are some new developments that have taken place to the west of the station again, and some to the south. The ones in the south are smaller developments.

We can see that in the small vicinity surrounding the station there has been an increase in the number in developments over a 10 year period. This is the case with areas further away from the station as well. The station has had an impact on the surrounding development, but has not been the only influencer. It is a positive aspect when developers look at the area to develop properties. The Zonk'izizwe Project would have been an influential development, had it taken place as the area surrounding the station towards the east wouldn't have been bare. It would have boosted the number of people using the train and uplifted developments to the north and south of the station.

Limitations to data gathering

Many limitations to data gathering were experienced during this part of the research. The first limitation I experienced was the limited number of people I managed to interview. As mentioned above, it was difficult for me to conduct interviews with people willing to talk to me. The second limitation I experienced when looking for data about the Gautrain and could not find information regarding the reason why the bus routes are only servicing the west part of the Midrand Station and not the east. The next limitation regarding the train was not being able to find information regarding the limited number of people that use the train. I was not able to find information as to why very few people use the Gautrain in Midrand. The reason for me not being able to gather this data is due to the lack of response from the Gautrain Management Agency after several attempts to contact them. The last limitation to data gathering I experienced was the lack of response from the City of Johannesburg Municipality to provide me with Land Valuations and Rezoning applications for the areas surrounding the station, which hinders my analysis of property surrounding the Gautrain Station.

TOD Contribution to the Station Precinct

Using the Urban Development Framework (2008), this next chapter will look at the Transit Oriented Development Principles that are to be applied to Midrand Station Precinct in order to achieve a fully functional transit node. It looks at the issues present and the key findings that can be used to implement the principles.

Figure 4.18: Accessibility. Source: Arup (2008)

The first principle is *accessibility*. This is the ability to accommodate movement across an entire area, for all people and modes of transport. It links accessibility of the station as well as areas surrounding the station. In order to be fully accessible, the station requires regional and local access and trough-site connections. Key findings show that pedestrian access is required across the main R101 buffer road to the station; there is a lack of lighting surrounding the station that needs to be added to ensure security. Signage needs to be put

up in more places so people can easily access the station without a map, security needs to be upgraded in the surrounding areas, access through Zonk'izizwe is needed and lastly a transport hub is needed to facilitate marginalized areas (Arup, 2008).

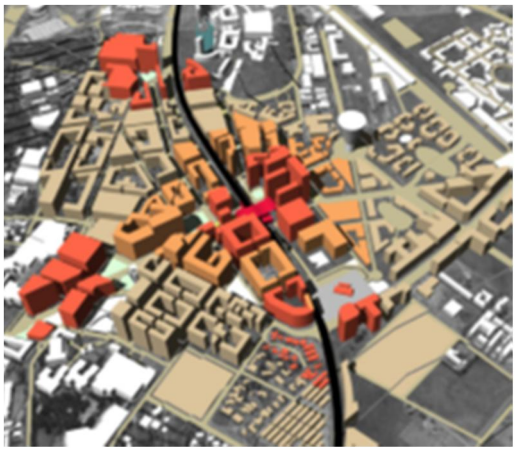

Figure 4.19: Development Value. Source: Arup (2008)

The second principle is *development value*. This looks at the development opportunities surrounding the station, and the added value it will have for the precinct. It includes development along Grand Central Boulevard as well as Old Pretoria Main Road with a diversification of functions in the area. Development site opportunities include Zonk'izizwe, large areas of undeveloped land on Dale Road, land surrounding Gallagher Estate and land available opposite the station. Key findings show that development can take place by exploiting unused land, considering retail options within the station may increase land value, densification and diversification of the CBD is required and developing the area immediately after the station has the highest chance of gaining the highest development value.

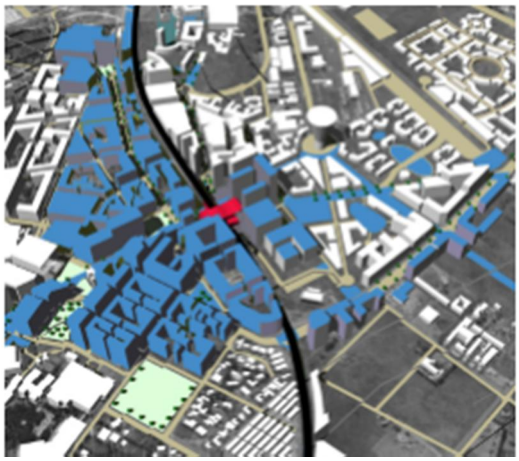

Figure 4.20: Integration. Source: Arup (2008)

The third principle is *integration*. This includes relocating the bus facilities and upgrading the taxis to incorporate them better into the public transport realm and make all modes of transport work as one entity. It includes creating a link through Zonk'izizwe to integrate communities to the east of the station. The integration factor also includes incorporating a variety of building types and public spaces into the station precinct. There is no direct connection with the station and retail facilities. The public transport and pedestrian connection to the station is weak and the main taxi rank in the CBD is not accessible to everyone in the Midrand Area. Key findings show that in order to facilitate integration, design and plan from the station towards Boulders node needs to be created, consideration of retail along the main routes of the station will boost integration, creating provision for taxi rank integration with the station will improve the public transport factor of the area and ensuring feeder routes from the station to both and east and west directions around the station will increase integration in the precinct.

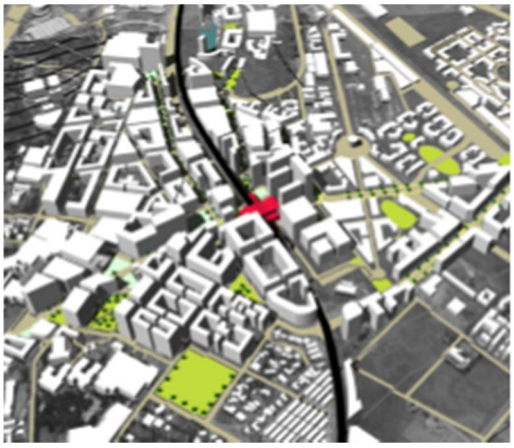

Figure 4.21: Liveability. Source: Arup (2008)

The fourth principle is *liveability.* This is the standard and quality of life and sociability enjoyed by all users of the area. It includes economic and social engagement of transport, land uses and the community. It also includes a mix of cultures and lifestyles with safety and a good quality of life in an urban setting. Within the station precinct, there is a variety of informal traders, industrial workers, construction workers and business people. The station serves as a point of destination and not an area where people would spend a lot of their time. The types of land uses include light industry and low density office parks with a few mixed uses in the precinct. There is no pedestrian realm as there is a lack of pavements for them to walk on amongst other issues such as no lighting, and no security presence. The entire area lacks a public environment feel. Key findings include implementing plans that add to the culture and liveability demands to the area, create a destination concept to attract users, improve access to the train and improve retail opportunities, upgrade and re-organise the taxi interchange and pedestrian access and lastly improve the public environment by creating open spaces linked to key land uses.

Figure 4.22: Sustainability. Source: Arup (2008)

The last principle is *sustainability*. This is the integrated ecological and socio-economic sustainability strategy for the area. it has been noted that the area surrounding the station is of low density and need to be densified to provide a sustainable target market, marginal areas are isolated from the station such as Ivory Park and Ebony Park, proposed developments such as Zonk'izizwe and Waterfall will add to the sustainability of the area. They will encourage security and sustainability. Key findings include reviewing the current land uses to improve and include a ix of various land uses when densifying the area, ensure that new developments are energy efficient and they consider water and sanitation sustainably,

promote the development of green buildings, or upgrading old building to green ones to increase sustainability, ensure water requirements will be met using sustainable means such as on-site rain water harvesting and using grey-water, lastly consider solid waste collection to be removed sustainably such as recycling on-site or sold to recyclers and deposited in bio-degradable facilities.

The above principles have shown that there are many ways to develop the station precinct and in order to achieve complete TOD culture; these principles need to be implemented

Proposed Plans for 2025

Arup and the City of Johannesburg Municipality came up with a number of UDF plans and guidelines for the Midrand Gautrain Precinct that would be realised by 2025. This masterplan consists of six different plans for the area. This section will look at three of those plans which will affect the station the most. These are a Land Use Plan, a Built Form Plan and a Movement and Transport Plan.

Land Use Development Plan

This plan has taken into account the need to strengthen the current land uses already existing in the area, and had introduced an integration of mixed use and various activity areas to appropriately develop a TOD node. The UDF promotes the idea of creating a mixed use space immediately outside the transit stop in order to provide for the needs of everyday users. The reason they have been planes so close to the station is to provide to people in a wider catchment, and so that it can be easily accessible by foot or public transport to the local population. Moving away from the mixed use core, the land uses will remain similar to their surroundings such as light industrial/commercial and residential will be built up into regeneration clusters surrounding the mixed use node.

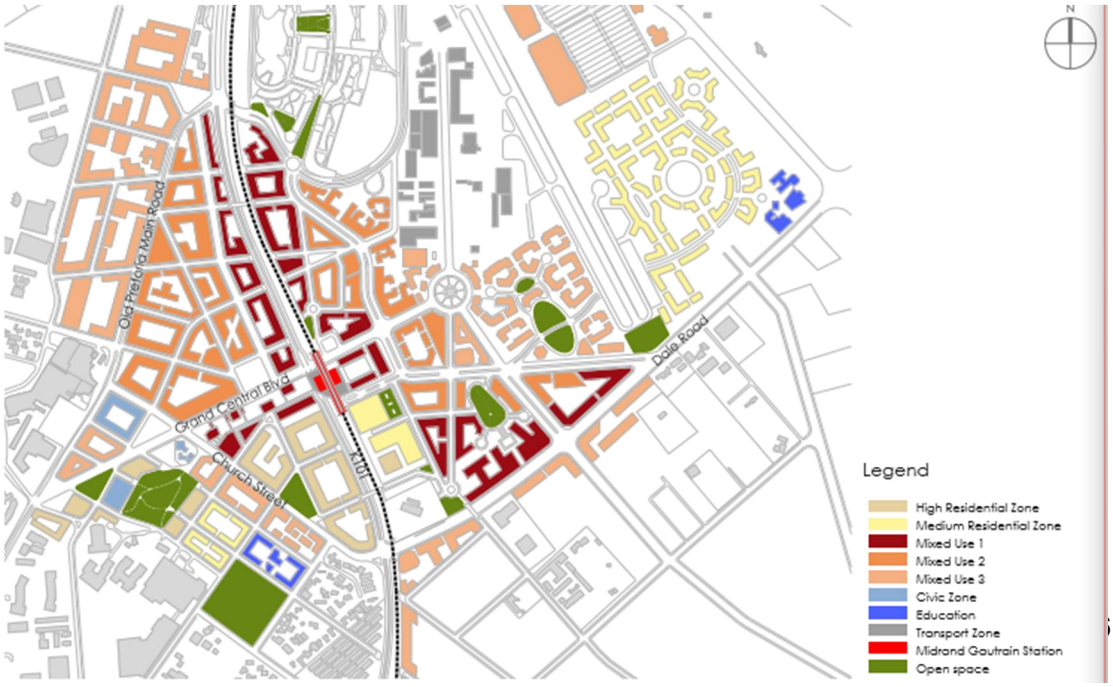

Figure 4.23: Land Use Development Plan. Source: Arup (2008)

Built Form Plan

This plan looks at the development of built form around the station. it aims to ceate a lively and safe city through space and sightlines. It looks at development of built form on the west of the station and ensuring that these developments do not create blocked views and dark isolated spaces. The development is focused along the main K101 road as it has the highest potential for success.

Figure 4.24: Built Form Plan. Source: Arup (2008)

Movement and Transport

Previous analysis conducted by Arup showed that the road network around the station precinct is congested during peak hours on weekdays. Traffic demand has limited the existing roads to be free flowing and accommodating to the number of cars, and no land uses can be currently accommodated without improvements to the transport system. The plan for transport and movement involves integrating public transport to improve capacity and accessibility to areas in and around the precinct. There is need to accommodate current and future transport needs when designing a solution. TOD has been chosen and the aim of this is to reduce dependence on private vehicles. The plan integrates walk and cycle modes, public transport and private vehicles. They need to work together for the plan to be successful.

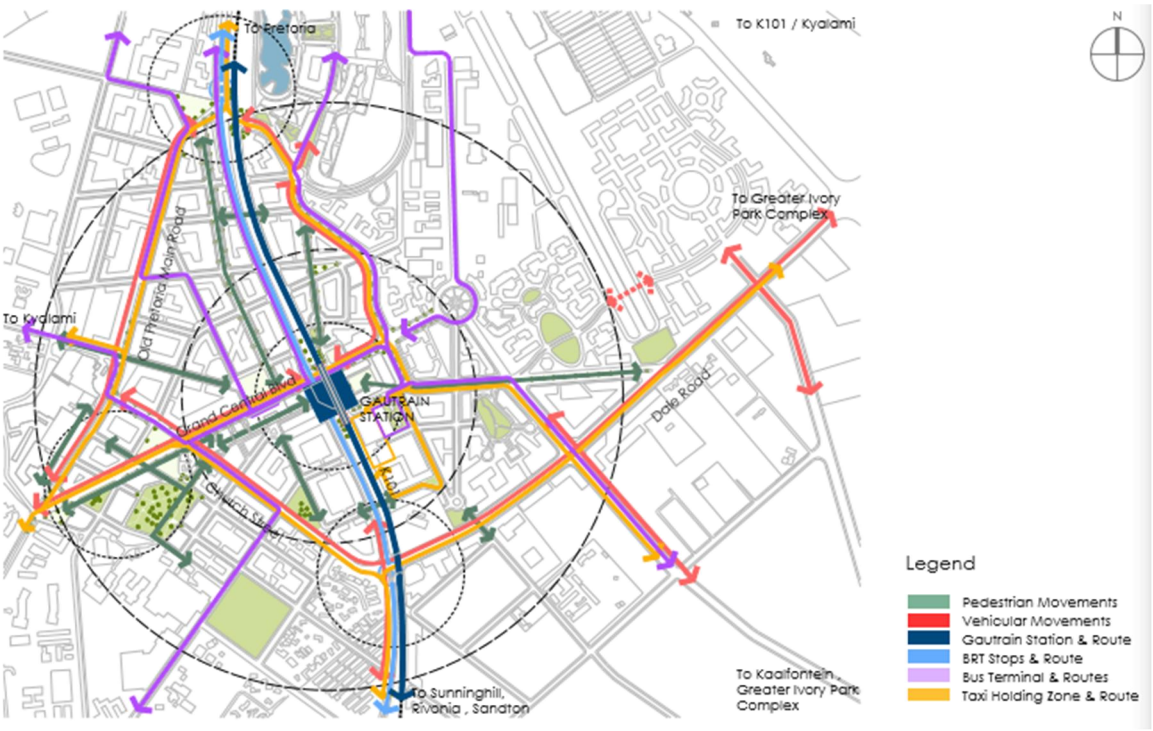

Figure 4.25: Movement and Transport Plan. Source: Arup (2008)

These Urban Development Framework proposed plans aid in reinforcing a number of policies and strategies. Mentioned above was the fact that policies came without any guideline. This is an example of proposing guidelines related to policy. The above plans allow for a greater level of accessibility to public transport, a quality urban environment, an integrated space of mixed land uses and a space for developers to have commercial opportunities.

Conclusion

The above chapter aimed at interpreting all the data gathered from policy documents, websites, observations, interviews and GIS mapping. It can be seen, especially from the mapping section that Midrand has seen change and development, but not as much as one would anticipate. It is certainly not what I had thought before beginning this research. There has been a small number of developments in the stations precinct, but it is an underwhelming amount. Although the Gautrain has brought in residents and businesses, many of these lie further away from the station. There has been a positive impact on the area with regard to access and mobility, but a negative one as well. There is a buffer created from the open piece of land adjacent to the train station, and the buses only serve the west of the station, which creates an issue of accessibility and reduced mobility for those living on the east of the station. Not being able to find land valuations and property prices had hindered my analysis as I feel that would have been a beneficial addition to my research,

and would have confirmed the benefit the Gautrain has had on property prices. Although it was noted that many respondents have noticed a price increase in land, I was not able to find evidence on this piece of information.

The implementation of TOD principles into the area may help boost development around the station. Another aspect that may initiate development around the station is expropriation of the Zonk'izizwe property by the Municipality for development. If the plans for Zonk'izizwe are realised along with the plans for TOD contribution and future land use and mobility plans, the area surrounding the station may become the high density transit surrounded node Gautrain Management Agency and the City of Johannesburg hoped for. It can be seen that the Gautrain station has increased development in Midrand and still has the potential to change the layout of the land. It is now up to the City and developers to make changes to the area that will ensure it becomes a high density, mixed use developed area.

Chapter Five: Concluding Observations

Overview

The above chapter looked at data gathered and analysed it with regards to development in Midrand, with a particular focus on land surrounding the Gautrain Station. This chapter will answer the research question, “What is the impact of the Gautrain Station on the development in Midrand”, as well as the sub questions. During the research many other findings emerged besides the developmental factor i.e.: negative impacts. This chapter will explore those additional findings. It will then explore suggestions from the researcher with regard to furthering development in the Gautrain precinct and lastly it will look at what implications this had had on planning and that will conclude the research.

Negative Impacts

With every development, both positive and negative impacts occur. There are many positive impacts of the station, and many have been looked at in the research, but negativity exists as well. The negative impacts of the Gautrain Station include:

- Property Prices- there has been an increase in the price of property surrounding the station. This has been both positive and negative. It is positive in a sense that the station has created better property values for the land around the station. on the other hand, it prevents many people of middle to low income brackets from purchasing or living in the area. The increase in property means an increase in rental space for both residential and commercial, and an increase in the cost of living in the area. The other impact the station has had is that for a certain radius away from the train, the price of land increases. After than radius, the price of land remains the same, or sometimes decreases. This has caused controversy within neighbourhoods as these zones of lesser value become undesirable and neglected, and people living there lose value for their properties.
- Crime- this is something that is so common in South Africa. It is also common for criminal activities to take place around railway stations. The Midrand station, standing in isolation, does not prove to be a very safe place to walk or wait around, especially in the evening at night. The lack of buildings, people and cars makes people waiting at the station very vulnerable. The fact that the station does not open to the public, and rather is a stand-alone development with a long road to enter, allows criminals to wait there and harm pedestrians.

- Isolation- the station is a sand-alone development. This means that people who ride the train cannot exit and walk out to a developed area. They would need to travel to reach any retail, commercial or residential development. This hinders the station from becoming a vibrant transit node as well as a mixed use development precinct. As mentioned above, the isolated station is also a space for crime to occur.
- Lack of development- the lack of development surrounding the station does not allow it to be classified as a TOD yet. It also stops other developments from taking place. The Sandton station has experienced development surrounding it since it began operating in 2010, and still has developments occurring till today.
- Empty parcels of land- the empty spaces of land surrounding the station are spaces where development can be initiated. The Old Mutual piece of land next to the station is wasted space currently and can be used for mixed use developments which can incorporate the station. These pieces of land should be expropriated from owners and developed by the city in order to make the station precinct vibrant and well developed.
- Noise- with any rail development, there is noise. The trains itself cause a lot of noise for the people and companies surrounding it. Many stations are underground so the people are not affected by it. However, Midrand station is an at grade station, which means that the noise of it passing every 15 to 30 minutes creates a disturbance for the surrounding developments and users of those developments.
- Price of riding the train- the Gautrain is known as an elite rail system as it only caters to the middle-high income people of the city. It is known for being expensive as a one-way ride from Sandton to OTRIA is currently R151. The prices change depending on the time of day one uses the train, and peak hour is the most expensive. A Gautrain Pricing table can be found in Appendix G,

Transit Oriented Development

This section asks the question, “Was TOD successful”?

The Gautrain Stations Plans were to operate as a transit Oriented Development, and this has to a certain extent been successful at some stations. Sandton and Rosebank possess more qualities of a successful Transit Oriented Development as they have the mixed uses and successful transit system to provide to the people working and living there. There are many people who ride the train in the morning and then walk or take the busses to their destination, and return to the station in the evening the same way. They are very busy

stations. Midrand on the other hand is still growing and has the potential to be a successful TOD. If the masterplan for 2025 is implemented, we can see that the Station will be specifically catered to be a transit node and work in harmony with mixed land uses and high densities. Unfortunately, that plan was developed nine years ago, and many of the City planned on doing have not begun. 2025 is another nine years away and that is not enough time to fully develop a fully functional transit node. 2025 is a goal year and it may take longer than that, but the Masterplan developed, if realised, will boost Midrand's development.

Answering the Research Questions

What kind of property development is taking place?

Property developments taking place in Midrand are mixed. There is a number of residential complexes as well as free standing homes, office parks and buildings, light to medium commercial developments and service buildings as well. Since the operation of the Gautrain has begun, the developments immediately after the Station have been few. This is because there is no surrounding development to entice developers to develop land there. It lacks amenities, social spaces and safety and security. Property development is taking place further away from the station and this is not a good sign for the station. it creates even more isolation and it is developing as a stand-alone project.

What has been the stations impact on property prices?

Having not been able to collect data regarding property values and prices, evidence on the impact on property prices is absent. However, from the literature review, we saw that prices of property closer to the station increase in value, and those further away reduce in value. We also saw in the interviews that many people working and living in the area have noticed that the prices of property have increased in Midrand as a whole. These may not be exclusively because of the station, but it is a contributing factor as it allows accessibility to the area, making it more desirable.

What changes is the Gautrain Precinct experiencing?

There are not many changes that can be seen from the GIS Mapping exercise conducted in the previous chapter. There is however been development in the entire suburb of Midrand. This means that the area is in demand, but not only because of the Gautrain. There has been an increase in the number of residential estates and office parks that have been built since the opening of the Gautrain. The precinct itself has many open pieces of land and the changes over the last 10 years have been underwhelming, considering it has the potential to boost economic and property development.

Has densification taken place in terms of people and property?

With regard to densification, the area has experienced a number of residents moving in since the start of operations of the Gautrain. According to census data, the number of people living in Midrand was 87380 and in 2017 the population is 173000 according to Tip Top Globe (2017). This shows that in the last six years the population has increased by over 70000 people. This is a significantly large number of migrants into the area. This increase in people has to be complemented by an increase in property. According to Cokayne (2015), Midrand, at the current rate of densification, may be one of the most densely populated areas in the next 20 years. He stated that the number of properties in Midrand had doubled since 2000 and the property booms were 2000, 2006 and 2010.

What can be looked at next to further research?

This research was done in order to add to the already existing data on the implications the Gautrain Stations have had and continue to have on their surroundings. this research is only a fraction of all the information out there, with regard to Midrand, and therefore is not a full extensive report on all the impacts the Gautrain station has had in Midrand. There is other information such as impact on residents, on governance, on the economy, on the social activity, impact on density and individual properties and companies and many more. The station may be researched in many ways. This does not mean that this research is less significant, but helps to show that there are many aspects that are affected by the station. If this research duration was longer, and to further my research, I would look at the economic impact the station has had on the area as this is a very significant topic that may affect the way development takes place.

Conclusion

This research has shown that there are developmental impacts that have occurred around the Midrand Gautrain Station and beyond its precinct. They consist of both positive and negative impacts. The increase in densities and property development shows that Midrand is becoming a popular area to locate to, and this is good for the area as it will ignite further development. It has been 6 years since the opening of the Gautrain and the area is slowly growing. There is need to develop land surrounding the station for it to reach its full potential. The proposed development in the Midrand Urban Development Framework is a good guide to begin development as it states clearly what needs to be done for the area to be a fully

functional TOD node. Midrand, unlike other stations is not built up, making developments easier to conduct as there is no need to relocate people to realise the Vision for the area. The station has not been used to its full potential and its value has not been realised yet. This allows the opportunity to create. Midrand still has a lot of time to grow. The future for Midrand and the Gautrain is a bright one. This leaves me with one question in mind, what will the Midrand Gautrain Precinct look like in 15-20 years, and will it have achieved its TOD status?

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Appendix
Appendix A: Questionnaire

Please tick yes/no and use yes to agree and no to disagree. For further explanation please use the reason column to explain why you think so.

QUESTION	YES	NO	REASON
Do you use the Gautrain?			
For what purpose?			
Do you use all or any of the following: Train, Bus, Parking			
Has the Gautrain increased or decreased the number of businesses that have opened up in the area?			
Had the Gautrain increased or decreased building projects in the area?			
Has the number of people living in the area increased or decreased?			
Has the number of people working in the area increased or decreased?			
Do people working in the area use the Gautrain to get to work?			
Do people living in the area use the Gautrain to get to work?			
Do you think development has been because of the Gautrain?			
Do you think businesses and residents moved to Midrand because of the Gautrain?			
Has the Gautrain increased land prices in the area?			
What kind of development is taking place around the station and bus routes?			
Has the location of the Gautrain affected other businesses?			
When did you open in Midrand?			
Why did you choose this area?			
Did you relocate here because of the Gautrain and bus route?			

Appendix B: Ethics Clearance Certificate

SCHOOL OF ARCHITECTURE AND PLANNING
HUMAN RESERCH ETHICS COMMITTEE

CLEARANCE CERTIFICATE
PROTOCOL NUMBER: SOAP079/07/2017

PROJECT TITLE:	The Developmental Impact of the Gautrain Station on Midrand
INVESTIGATOR/S:	Naeema Aiyub Surti (Student no #725027)
SCHOOL:	Architecture and Planning
DEGREE PROGRAMME:	BSc (Honours) in Urban and Regional Planning
DATE CONSIDERED:	16 July 2017
EXPIRY DATE:	16 July 2018
DECISION OF THE COMMITTEE:	APPROVED

CHAIRPERSON
(Professor Daniel Irurah)

DATE: 31-07-2017

cc: Supervisor/s: Aly Karam

DECLARATION OF INVESTIGATORS

I/We fully understand the conditions under which I am/we are authorized to carry out the abovementioned research and I/we guarantee to endure compliance with these conditions. Should any departure to be contemplated from the research procedure as approved I/we undertake to resubmit the protocol to the Committee.

Surti — 31-07-2017

Signature **Date**

Appendix C: Participant Information Sheet

Greetings

My name is Naeema Surti and I am student studying for my Bachelor of Urban and Regional Planning Studies (HONS) in the School of Architecture and Planning at the University of the Witwatersrand. One of the requirements for our programme is to complete a research report on a topic of our choice. I will be doing my research under the guidance of my supervisor Professor Aly Karam. My topic of research is 'The developmental impact of the Gautrain station in Midrand' and I will be conducting a survey in order to understand businesses and developers perspectives on how the Gautrain has impacted the area. I am inviting you to be part of this study by completing a questionnaire. It will take approximately 5 minutes to complete. The survey will ask you a few questions (you may write down your answer or verbally communicate with me) about how the Gautrain has impacted the area, if it has increased business, and the number of people moving into and working in the area as well as if the investments in the area have been due to the Gautrain station.

You have been selected to participate in this study due to the location of your business or development. Your participation in this survey is voluntary, you may refuse to answer any of the questions, and you may withdraw at any time. Your questionnaire, if chosen to answer it verbally, will not be recorded.

Your participation will be completely anonymous and no identifying information is required. Any information that you share will be kept confidential and can only be accessed by myself. However, I may quote your views in my final report, but in so doing I will not link them either to you personally or to your business. The results of this survey will be part of my research report and will be available to Wits staff and researchers as well as students, and it will be uploaded to the Wits Library Website. There will be no benefits to yourself, but if you would like a copy of the final report I can email you a copy after it is completed.

If you have any questions, concerns, or comments, please feel free to contact me at 725027@students.wits.ac.za or Professor Aly Karam at aly.karam@wits.ac.za or 0117177707

Appendix D: Consent Form

I hereby confirm that I have been informed by the student researcher on the purpose, procedures and my right as a participant. I have received, read and understand the written participant information sheet. I have also been informed:

- ☐ My participation is in the form of a survey,
- ☐ The place of study (Midrand)
- ☐ The reasons for the study,
- ☐ Why I was selected for the study,
- ☐ There will be no payment given for my participation,
- ☐ Guaranteed anonymity,
- ☐ Guaranteed confidentiality,
- ☐ How the research findings will be used

I therefore agree to participate in this study by completing the survey

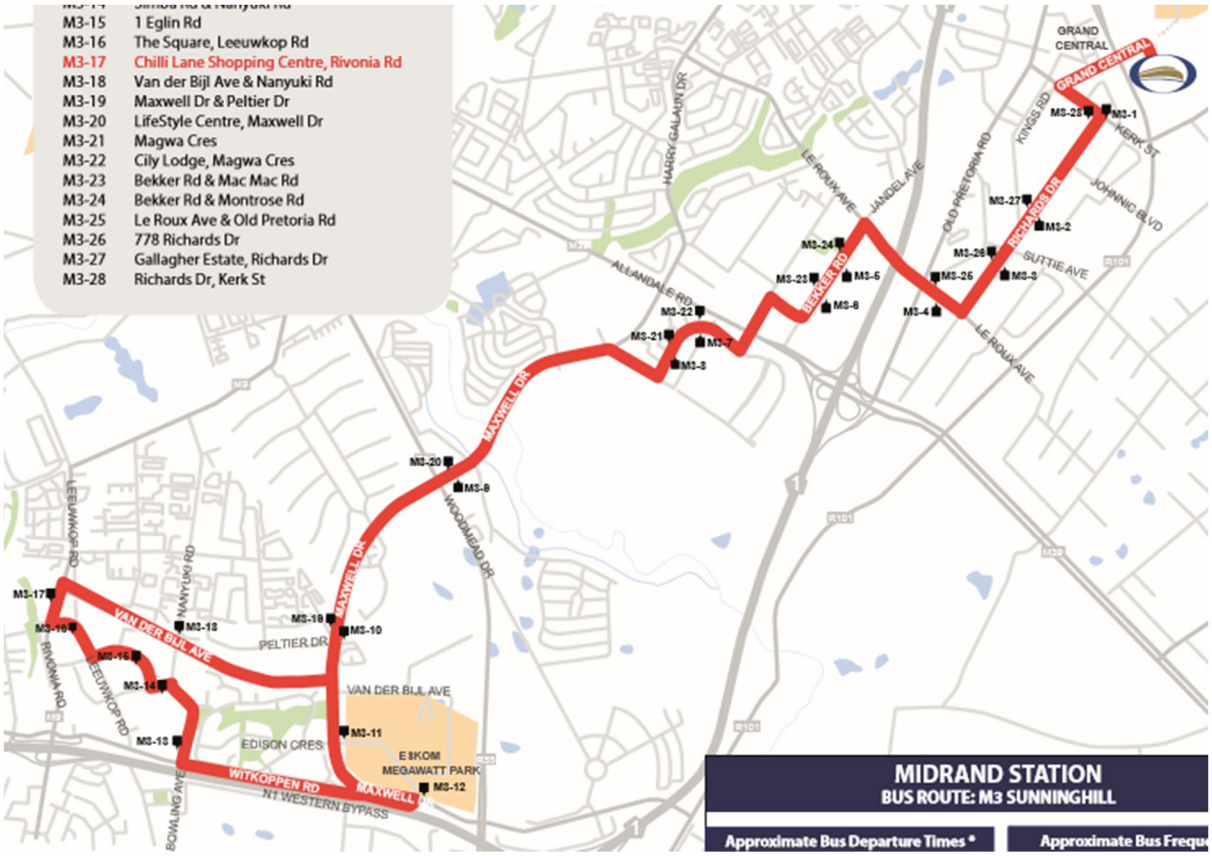
SIGNATURE DATE

_____ _____

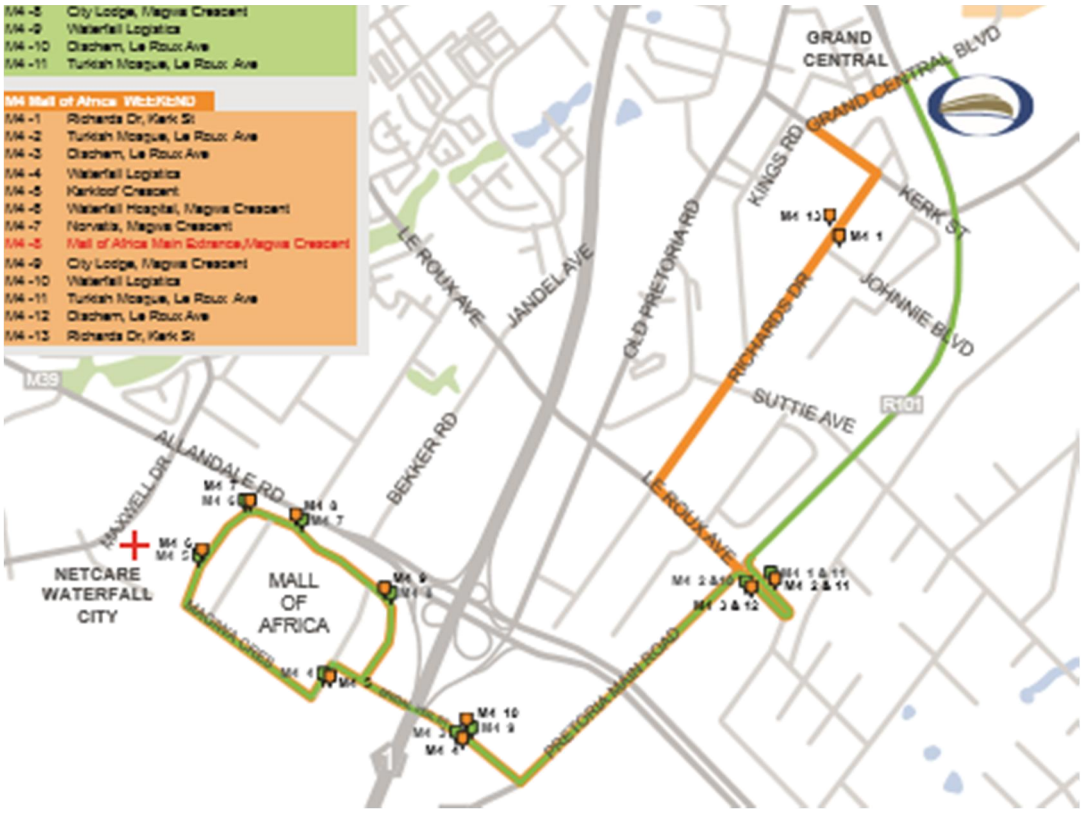
Appendix E: Gautrain Buses

M1 Bus Route Source: GMA (n.d.)

M2 Bus Route Source: GMA (n.d.)

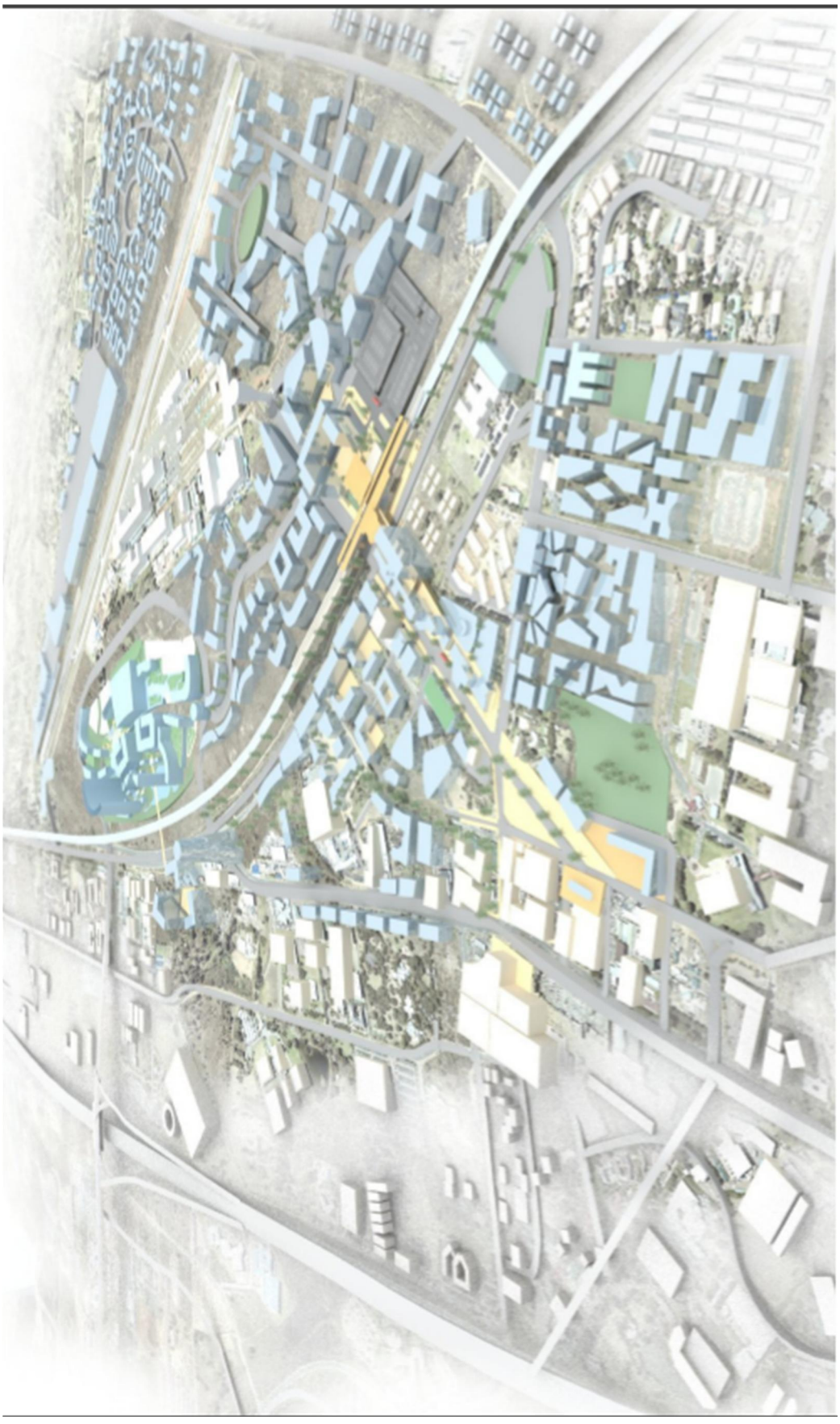


M3 Bus Route Source: GMA (n.d.)



M4 Bus Route Source: GMA (n.d.)

Appendix F: UDF Future Visualisation



UDF Visualisation for Midrand Precinct Source: Arup, (2008)